THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXII. No. 1854.] LONDON, NOVEMBER 22, 1898. [50TH YEAR. PRICE 6d.

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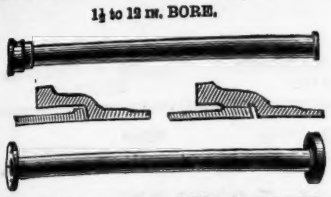

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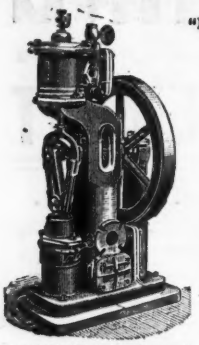

Fig. 705. "SINGLE RAM" STEAM-PUMP.

Fig. 695. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

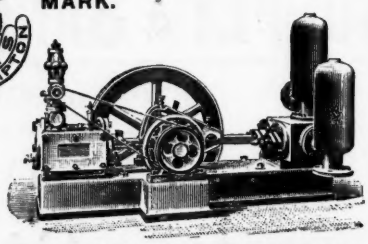

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

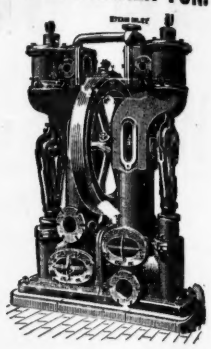

Fig. 712 "DOUBLE-RAM" STEAM-PUMP.

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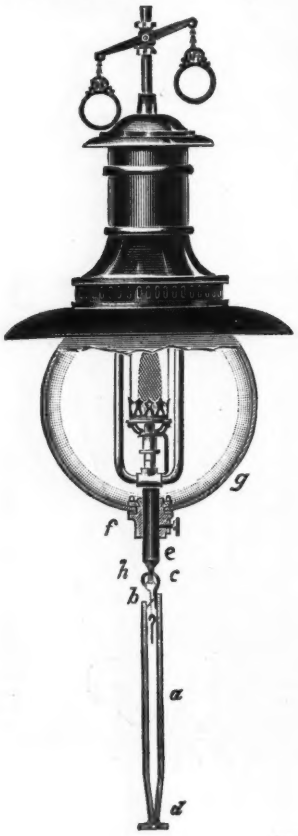

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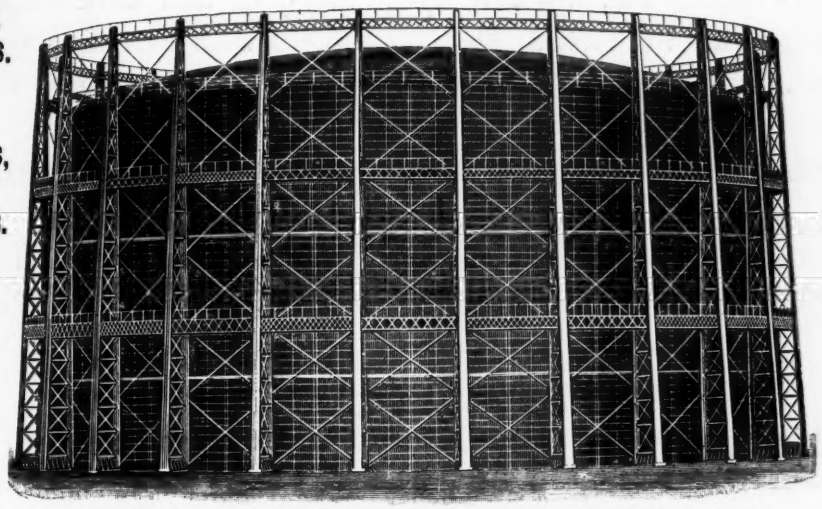

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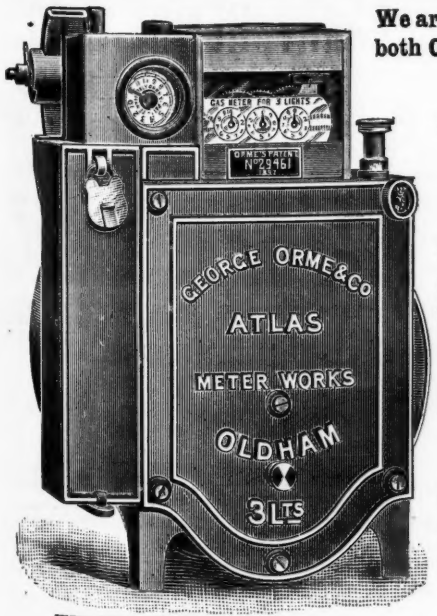

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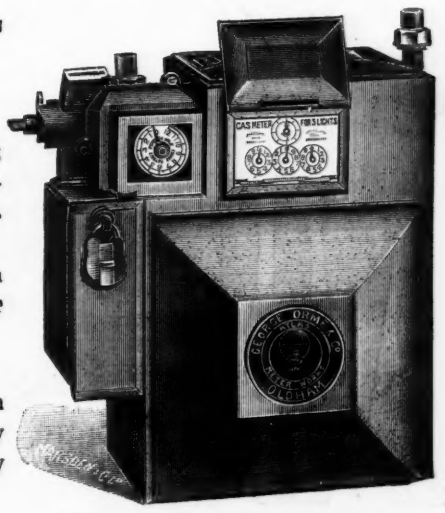

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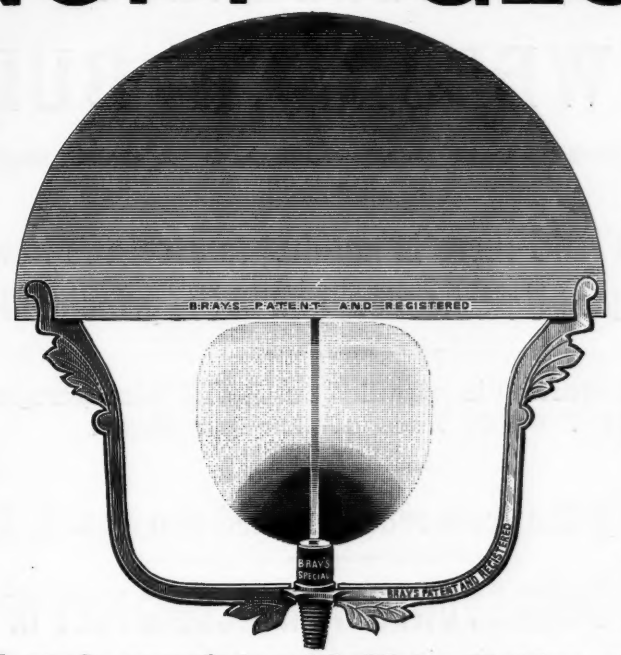

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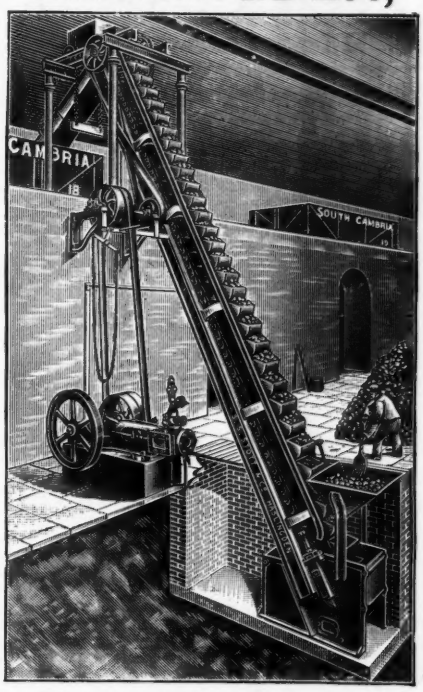

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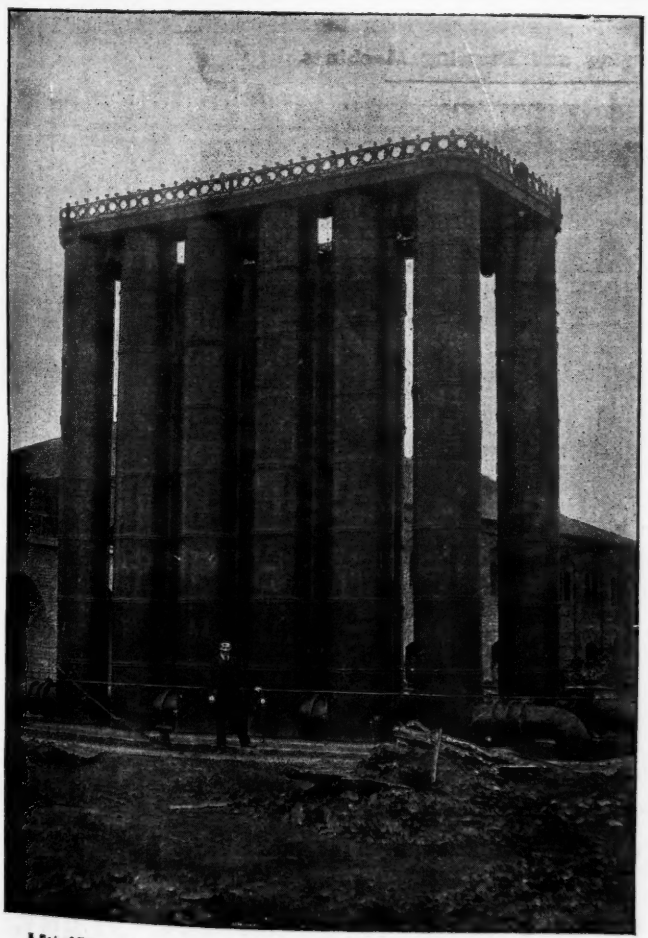

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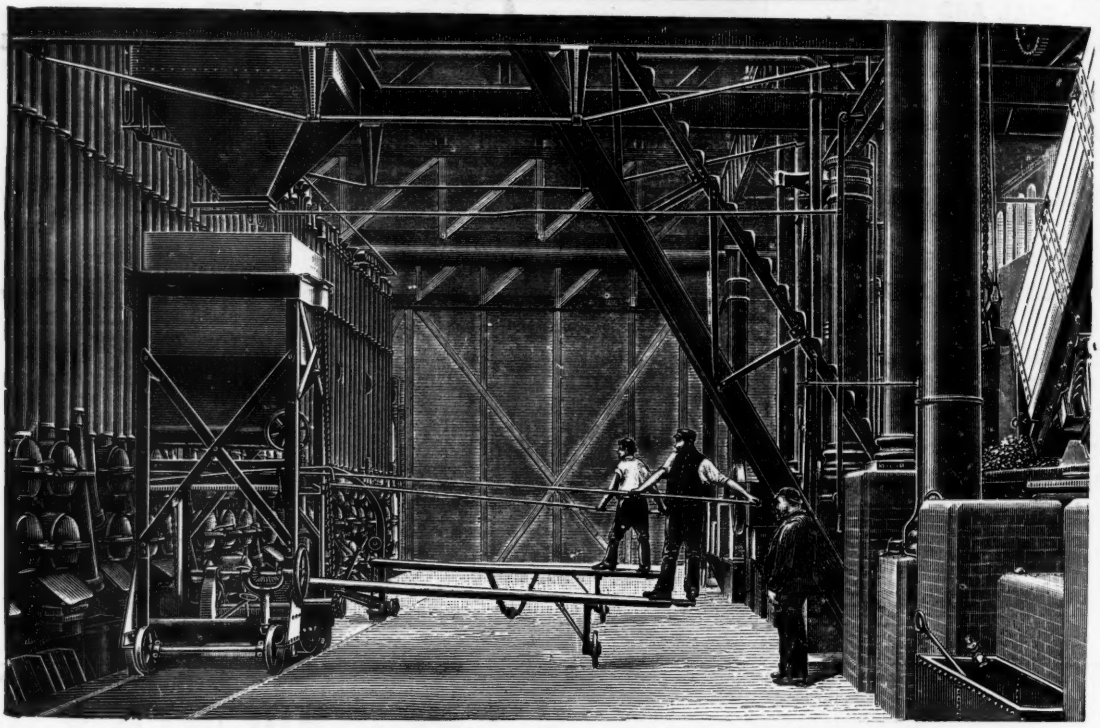

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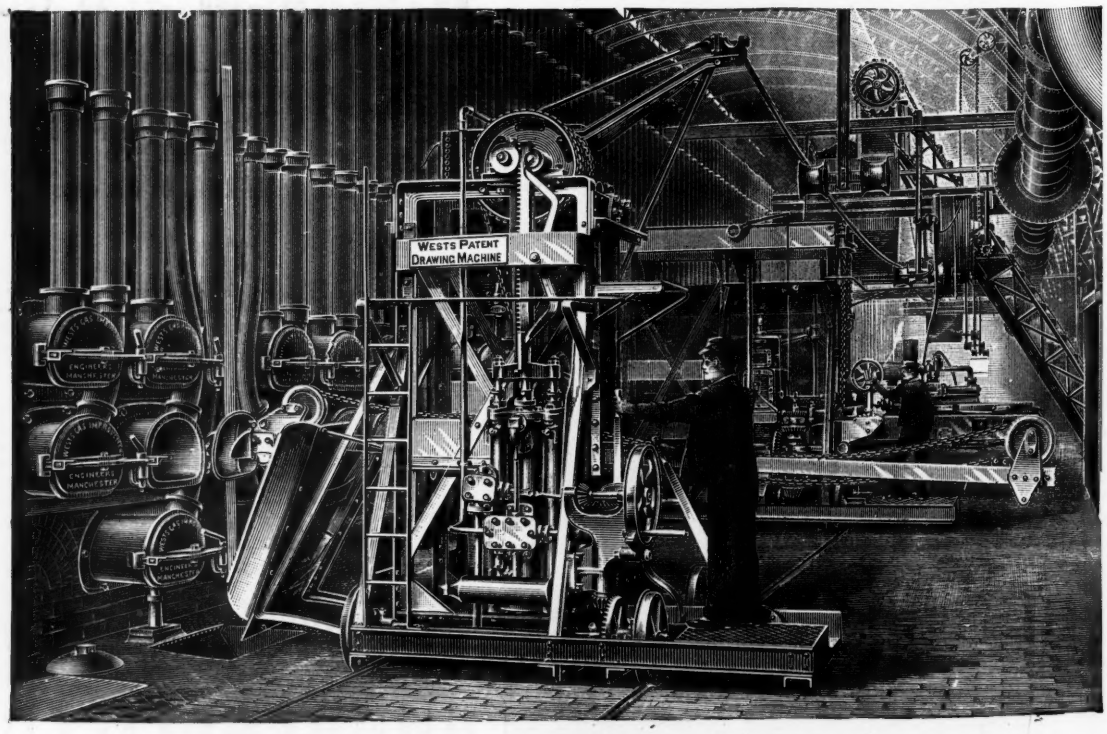

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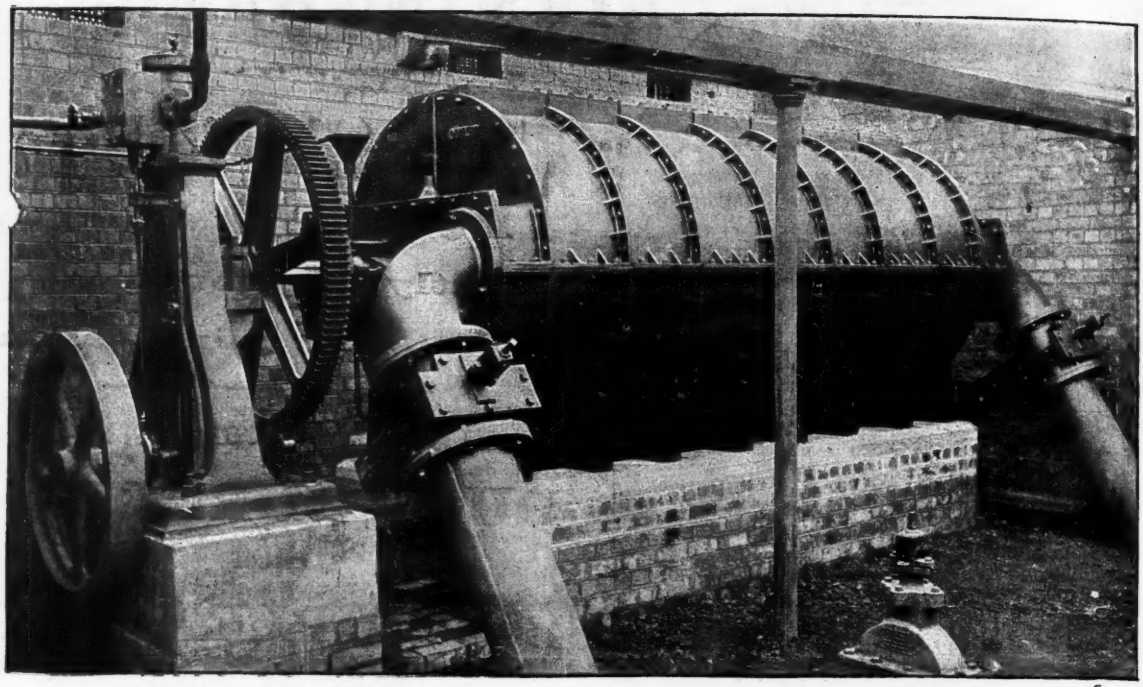

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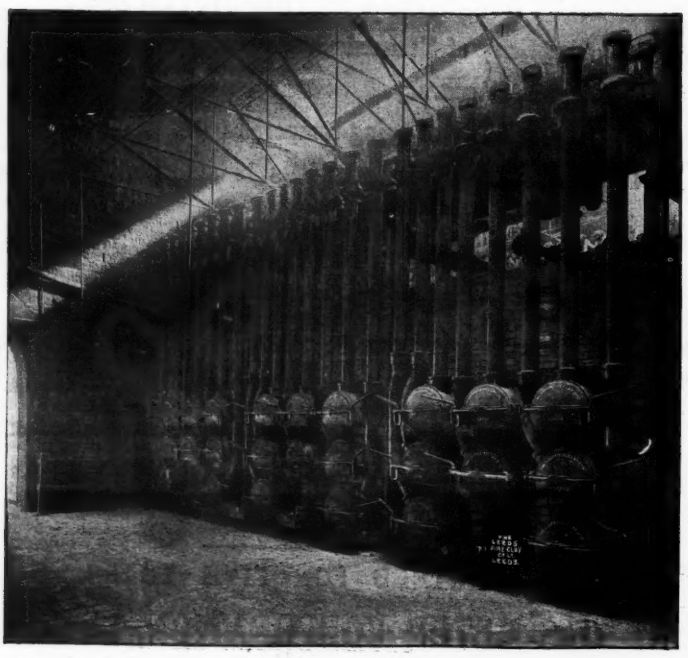

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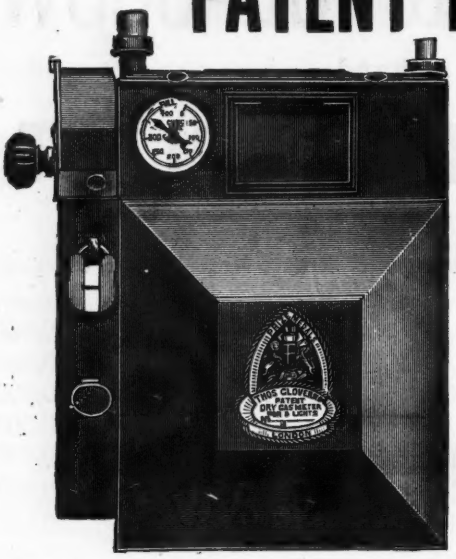

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EDITORIAL NOTES.

An Involved Incandescent Gas-Burner Lawsuit.

THE result of a piece of incandescent gas-burner litigation of a very peculiar and novel character is reported in our "Legal Intelligence" to-day. This is the case of *Hayes v. The New Incandescent Gas Company*, which turned upon a question arising out of a certain "deal" in incandescent burner patents. In the course of the proceedings, a point was raised (but not gone into) as to the principle covered by a De Mare patent which was alleged to be identical with that of the Kern burner now made by the Welsbach Company. The latter Company were no party to the present suit; but there was an allegation that they had been behind the plaintiff (who was negotiating for the purchase from the defendants of the De Mare patents) in a sense that should invalidate the bargain. It was pleaded that the plaintiff's object in acquiring the De Mare patents was to protect the Kern patent; but inasmuch as the latter patent is now the property of the Welsbach Company, the defendants objected to the turn of affairs, and declined to perform their contract of sale. Matters were complicated by the fact of the present defendants having instituted proceedings against the Welsbach Company, under the same De Mare patent, for infringement by the manufacture of the Kern burner. The anomalous position was thus created that the Welsbach Company were being sued for infringing a patent which was their own property, assuming the Hayes deal to hold good. Mr. Justice Romer has now decided that the contract in question was a *bonâ fide* one, and has decreed specific performance. Stay of execution was instantly granted, so that it is not safe to treat the matter as finally settled. But the practical effect of the judgment appears to be that the action of the Sunlight Patent Company against the Welsbach Company in respect of the Kern burner patent must be stayed. It is part of the settlement, however, that the Sunlight Patent Company are to have a licence to use the De Mare patents which they have sold to the plaintiff Hayes. Thus there will be a Sunlight burner which is also a De Mare burner; but whether this is the same as the Kern burner of the Welsbach Company is quite another story. At any rate, the Sunlight Company cannot attack the Kern patent from the ground of the De Mare patents with which this lawsuit is concerned, unless and until Mr. Justice Romer's judgment is revised by a Superior Court.

The First Appeals under the Workmen's Compensation Act.

THE first appeals from County Court judgments under the Workmen's Compensation Act were heard and disposed of on Saturday. In one case, a stevedore was employed in discharging the cargo of a vessel lying at one of the quays of the Royal Albert Docks, being moored thereto. The unloading was effected by means of a hydraulic crane, standing on the quay; and the accident upon which the claim arose was an explosion of a case of percussion caps. The question was whether the Act applied. In order to ascertain this, a long string of definitions had to be adduced from the new Act, and also from the Factory and Workshop Act, 1895. The County Court Judge had given a decision in favour of the claimants. Counsel for the appellants argued that a ship does not form part of a dock; but the Court dismissed the appeal, without, however, defining when a ship is or is not a dock. The defendants were using a quay; and the injured workman was certainly employed "about" the crane by means of which the cargo was being discharged. In the other case, the plaintiff had been injured by a brick falling from a building in course of erection. When finished, the building would be four storeys high; but when the accident in question happened no part of the walls was up more than 26 feet. The Act does not apply to buildings less than 30 feet high; and the question was whether the actual or the complete height was to be regarded. The County Court Judge had decided against the claim; and the Court of Appeal confirmed the decision without calling upon Counsel for the defendants—remarking that nothing could be plainer than the words of the Act.

Industrial Legislation Actual and Prospective.

MR. CHAMBERLAIN spoke last week in Manchester upon various topics of actual and prospective political interest; and not the least important of these were the cognate subjects of Workmen's Compensation for Accidents, and

Old-Age Pensions. It has not hitherto been customary to regard these ideas as having any close connection with one another; but those newspaper writers and public speakers who have failed to perceive the relationship between them will be well advised to think the matter over in the light of this suggestion. Naturally, as a member of the Administration responsible for the Workmen's Compensation Act, Mr. Chamberlain is anxious to defend the principle of the Act, which he explains as being "that "when a man is injured in the ordinary course of his em- "ployment without wilful misconduct on his own part, he "is entitled to charge the compensation of that injury as "a liability upon the business in which it took place." As a politician, also, he is concerned to show that the parallel Bill promoted by the other Party—Mr. Asquith's Bill—was a mistake, and was a Bill that would have profited the lawyers more than anybody else. Mr. Chamberlain claims for the existing Act that it is at least definite, and avers that it does not impose an undue burden upon the national industries to which it is applied. The industry which it was expected to hit hardest was coal mining; and Mr. Chamberlain, according to his manner in controversy, called by name on Sir Joseph Pease and Mr. Bainbridge to justify or withdraw allegations they made in this regard while the Bill was passing through the House of Commons. These representative coalowners said the Bill would put a tax of 3d. per ton upon the coal raised in England. The Northumberland and Durham Miners' Relief Fund has offered to take the whole burden of the Act for 0·7d. per ton, which the coalowners refused. Hence, whatever may be the causes of the advanced quotations for gas coals in this region, the Workmen's Compensation Act is not one of them, or not to an appreciable extent.

With regard to Old-Age Pensions, Mr. Chamberlain is in the difficult position of believing in the principle of securing "the veterans of industry—the men who have "fought the good fight—from the worst consequences of "failing power and of undeserved misfortune," while being unable to decide upon the means of carrying it out. Yet the problem is a pressing one, and is becoming more insistent every day with the rejection from employment of elderly men. Whatever else the Workmen's Compensation Act is doing, it is rendering it imperative upon employers to weed out from dangerous employments the men who, through age or bodily infirmity, are unable to take the fullest care of themselves. The masters are not to be blamed for this proceeding. It is only the industrial counterpart of the "short service" system, whereby the army is kept pruned of those "old soldiers" who were of no use with the Colours, even to themselves. All the same, the policy points directly to fresh legislation, when the way shall have been made clear.

Mechanical Road Traffic—Electricity Not In It.

In view of the actual position of the problem of mechanical road traffic, and the series of articles now running through our columns, which aim at setting out the prospects of gas and electric tramway traction, it is worth recording that two years have elapsed since the relaxation of the laws relating to locomotion on British highways permitted self-propelled road carriages to show their paces. The anniversary was celebrated in London, in true British fashion, by a dinner organized by the "Automobile Club of Great "Britain and Ireland." This cumbrously-named association has recently absorbed another society of similar aims; and the blended forces of the two organizations succeeded in getting together a respectable company to commemorate the coming into operation of the Locomotives on Highways Act. Mr. Shaw Lefevre, the Minister who, as President of the Local Government Board, was instrumental in procuring the statutory removal of the man with the red flag who was supposed to stand in the way of the improvement of mechanical road carriages, was present, and he made a not uninteresting speech. He confessed, however, that the removal of the statutory hindrance to the application of mechanical power to road carriages has not had the effect he anticipated from it. This is an old story. People clamour for the removal of what they fancy to be an artificial obstacle to their legitimate advances in a particular direction; and then, after the obstacle has been removed, they discover that they do not want to go that way. Mr. Shaw Lefevre was convinced, when in office, that Great Britain was behind other countries in the development of the road motor; and he accordingly drew up a Bill "to "remove the disabilities of antiquated legislation." Let us pause here just to remark how interesting it would be if these words formed part of the preamble of other Improvement Bills. At any rate, Mr. Shaw Lefevre had his desire. He "looked to the disappearance of horses from "the streets within three or four years." Alas! the hope was vain.

On the morning of the same day, the third annual meet of the Motor Car Club in Whitehall was held, and was well attended. It is significant that, whereas the object of the first rendezvous of the kind was a drive down to Brighton, this year the bold motorists were content to get as far as Richmond Park, and (some of them) back again. We mention the meet here, because we have always taken a sympathetic interest in the subject since our esteemed contemporary the "Engineer" vainly offered a prize of a thousand guineas for a satisfactory road motor. Also, the progress of the road motor, such as it is, is a decided set-back to the overweening pretensions of the electricians to have "the future" in their keeping. Mr. Shaw Lefevre twaddled very amiably in the evening about the ultimate solution of the problem of mechanical road traction being reserved for electric power. "Electricity" means as much in the mouths of such speakers as did "Mesopotamia" to the old lady of blessed memory. The fact remains that petroleum was far and away the most common source of power represented at last week's meet. A few of the now familiar yellow electric cabs that buzz along the streets of London with their carefully-limited loads were present; but otherwise electricity was not in evidence. This is a poor showing for the "motive power of the future;" for that which has no beginning rarely comes to any good.

Sir John Wolfe Barry on London Streets.

An extremely interesting Inaugural Address was read at the opening meeting of the Society of Arts last week, by the Chairman of the Council, Sir John Wolfe Barry. It is a long time since we had the pleasure of following an engineering essay so well composed, and dealing with so happily-selected a subject. The Chairman's topic was the requirements of Modern London in the matter of street and thoroughfare accommodation—a tremendous subject indeed. Sir J. W. Barry's handling of it will greatly enhance his reputation. A Presidential Address, especially when intended for a Metropolitan audience, is a great difficulty; but, to paraphrase the adage, it is an even greater opportunity. On the occasion under notice, Sir John had the felicity of feeling that both his subject and the treatment he was able to give to it were exactly to the taste of his distinguished audience. The streets and thoroughfares of London, having regard to the needs of the foot and wheel traffic circulation—how manifold and diverse are the pictures which the words conjure up before the mind's eye of the man who "knows his London," though never so slightly! When the gas engineer thinks of the streets of London, his mental vision pierces through the surface of the roadway and footpaths, and he sees the cast-iron mains and services lying alongside and crossing the multifarious other pipes, conduits, and cables crowding the subsoil. The vision of a railway engineer goes deeper still, to the tunnels that convey their tens of thousands of passengers and hundreds of tons of goods into and across the great human hive. When Sir J. W. Barry spoke of the streets and thoroughfares of London, however, he chiefly meant to discuss them in their superficial aspect, as means of communication for the inhabitants. He first defined London as an occupied area nearly oval in shape, having a major axis, east and west, of 12 miles, and a minor axis, north and south, of 11 miles. This area is consequently about 122 square miles in extent, and has a population of nearly five millions. The Greater London under the protection of the Metropolitan and City Police extends over an area of 688 square miles, and has a population of nearly six millions. The denser populated region, designated by Sir J. W. Barry as Urban London, occupies a central area of about 95 square miles, and has a population of something like four millions.

This enormous population is very much alive, and pretty constantly on the move. Familiar as the phenomena of London street life are to us to-day, it is certain nobody living sixty years ago could have foreseen them. As a matter of fact, London has had its street and railway facilities provided piecemeal, and has also gone on from hand

to mouth in a number of other respects. The gas-works were banished out of town, along with the slaughterers and numerous other purveyors whose room was preferred to their company; but every such move threw more traffic upon the streets. Sir J. W. Barry showed that there had never been an adequate grappling with the problem of thoroughfare provision. Over and over again have street improvements been carried out, and then discovered to be nugatory owing to the re-appearance of the "neck of the "bottle" a little farther on. We must look abroad—to Paris, Vienna, and the United States—to see thoroughness and adequacy in the laying out of city streets. Sir J. W. Barry declares that new and additional lines of arterial streets are urgently required to provide for the internal traffic of London. He will not recommend more railways, which only bring people into town without enabling them to move about freely when they leave the stations. This means subways for the gas and water mains. But the question of subways in general is a very large one, and should be thoroughly considered before any such great schemes of arterial communication are entered upon.

Sir W. B. Richmond on the Smoke Nuisance.

THE perennial "smoke nuisance" forms the subject of a letter to "The Times" by Sir W. B. Richmond, written during the fog of Thursday last, which was the first of its kind for the season. Those who live in London all the year round expect their little fog at the usual time, about the middle of November, although the finest specimens do not usually appear until a month later. Last Thursday's fog, Sir W. B. Richmond complains, was really no fog at all, but only smoke. Usually, when a thing is said to be "only smoke," the meaning intended to be conveyed is that it is nothing at all. The case is different when a London fog, or what passes for it, is concerned. Sir W. B. Richmond protests that such an atmospheric infliction as that of Thursday is more or less preventable. He is persuaded that "the nuisance can be greatly modified, "if it cannot be wholly got rid of." Unhappily, this is a question of the enforcement of the law, which is not easy to procure when an apathetic public or local authority are entrusted with the initiative. It is quite refreshing to find this impartial observer witnessing that, "owing to the "almost weekly additions which are made of electric light "stations in the Metropolis, and are apparently under no "control whatever, the smoke, and consequently the dark-"ness and dirt, of London rapidly increase." Well, well! And this is the deliberate judgment of a leading artist on the arrangements by which the cleanest, most sanitary artificial light known to science are rendered available in London! Sir W. B. Richmond thinks that the suffering public ought to combine with the object of compelling the reluctant Local Authorities to set the Smoke Prevention law in motion against all the offenders. So far as London is concerned, remissness on the part of the Vestries in this regard is amenable to correction by the London County Council. It is suspected, however, that this body has its attention too much engrossed by "big" schemes to have any aptitude or time left for attending to the duties already confided to it by statute. Sir W. B. Richmond's complaint has been sympathetically received by "The Times," which ingeniously suggests that the electric lighting companies may not be wholly averse to creating, by their smoky chimneys, a degree of artificial gloom for which it is their business to provide a remedy. This arrangement, however, is characterized as being both cumbrous and wasteful. The London County Council should see to the complaint. It will be in vain that the calling of the common domestic chimney-sweep is rendered unremunerative by the growing popularity of the gas-fire and gas-kitchener, if the electric lighting station is permitted to poison the air for acres round. Now that "Richmond's in the field" (Sir W. B. of that ilk), perhaps the London County Council may rally to him. They would do it quickly enough if he would only engage to paint (gratis) a series of tableaux representing the Progressive County Councillors sitting in judgment on a bevy of Moderates charged with permitting smoke.

Athermanous Glass.—A glass which is specially obstructive to the passage of radiant heat can be made from a mixture of 70 parts of sand, 24 parts of Kaolin, and 35 parts of soda. According to "Glasindustrie," only 11 to 12 per cent. of the heat radiated from a gas-flame passes through glass 0·3 inch thickness made from the above composition.

WATER AND SANITARY AFFAIRS.

THE sittings of the Royal Commission on the London Water Supply occupied two days last week. Yesterday there was a private sitting for the purpose of preparing a report relative to the question of establishing an intercommunication system between the works of the several Companies; and to-day further evidence will be taken on the general question of the supply. It is reasonable to expect that the policy of the Government with regard to the Metropolitan Water Question will be largely influenced by the purport of this intermediate report. If it is shown that by connecting the works of the several Companies a sufficient water supply for the present, and for some time to come, will be furnished to the East London district in particular, and to any other that may be in need of help, the more pressing part of the problem will be thereby solved. Then will follow the larger question, on which the Commission will resume their inquiry to-day, as to whether other sources than those now employed should be forthwith resorted to in order to secure an adequate supply for the growing population of London in a not distant future. There is evidence now before the Royal Commission, from Mr. Bryan and other engineers, which to an outside observer has every appearance of proving it is only necessary for the Companies to aid each other in order that London may have all the water it wants. How it may fare with some future London, of almost incalculable size, is a speculative question involving a variety of considerations, mainly of a hydro-geological character, which a Royal Commission may be quite able to grasp, and on which it may be desirable for the Government to be enlightened. It will be highly unsatisfactory if one Royal Commission should contradict another—Lord Llandaff and his colleagues arriving at conclusions differing essentially from those propounded by the Commission of which Lord Balfour of Burleigh was Chairman. If we look to the origin of the present complication, we may easily trace it to the action of the County Council. All the trouble and apprehension now prevailing with regard to the Metropolitan Water Supply has been brought about by the authority at Spring Gardens. Had there been no County Council, and no authority to take the same line of conduct that we have seen pursued by the existing body, there would have been a far different state of things prevailing during the past summer than that of which complaint is made. But taking things at their very worst, what is the outlook? For the next ten or fifteen years—despite any likely achievement by the County Council—London must depend upon the present sources of its water supply. Common prudence demands that these sources should be developed to the extent which circumstances show to be necessary. Should the Royal Commission finally report in favour of the Welsh scheme, or something equal to it, that will not alter the present situation, or affect the necessity for enlarging the works of the Water Companies. If the Council were in possession, what would they do? Would they sit down and say: The water is coming all the way from Wales, and will arrive in London a dozen years hence. Would they not forthwith proceed to do something nearer home? Whatever this might be, the Water Companies may be trusted to do all that the County Council would undertake. Let the Water Committee of the Council propose present measures, and sketch a plan which shall prove effective throughout the next twelve or twenty years, and they may discuss their Welsh scheme at their leisure, leaving the Companies to do the immediate and the practical. But such a mode of proceeding is not part of the Council's programme.

Judging by the Bills of which notice has been given for the coming session, the Parliament of 1899 will have abundant opportunity for discussing the Metropolitan Water Question. The County Council come forward with their scheme for a reservoir in Hertfordshire and another in Brecknockshire, on the River Yrfon, with an aqueduct to connect the two. Those who rely on the purity of water derived from the Welsh valleys may observe that the supply is to pass through filter-beds at Edgware and Hendon. There are to be subsidiary aqueducts and other works, and there is to be power of contracting to give—or rather to sell—a supply to local authorities, corporate bodies, and "persons." The County Council Bill for the purchase of the undertakings of the Metropolitan Water Companies includes the famous arbitration clause, which though now somewhat amended

from its original form, is obviously designed to whittle down the value of the undertakings to the lowest possible point. Power is sought—of course, subsequent to purchase—for the execution of any works "necessary to enable water "from the River Thames or elsewhere to be used in par- "ticular districts which have been or are inadequately "supplied by the Water Companies or any of them, or "in which any dearth of water seems likely to occur." Such power as this is exactly what the London County Council would deny to the Companies. The Metropolitan Water Companies have a Bill for improving and facilitating intercommunication between their works. This, of course, will be strenuously opposed by the County Council, however beneficial such an arrangement would be to the consumers or some of them. The reason for such opposition has been well expressed before the Royal Commission. In the first place, Sir Alexander Binnie strongly objected to the Council "being saddled," in the event of purchase, with the expenditure of "half a million" which the Companies proposed to lay out upon their intercommunication scheme. The possible expenditure, we may just observe, is considerably less than half a million; and Sir A. Binnie omits to tell us what will be the cost of the works which the Council intend to carry out to guard against a future drought. But the special point consists in a remark by Mr. Balfour Browne, that if "we"—the County Council—bought the East London Company now, we should buy them as a defaulting Company, which "we" could not do if they were able to avail themselves of their intercommunication scheme. The consumer may perish that the Council may buy cheap. But we observe that the East London are not a defaulting Company. They are well within the provisions of the statute, which exempts them in all cases of unusual drought. Other Bills coming forward include two by the East London Company—one for additional works, the other to secure a temporary supply from the Thames in excess of their present authorization. The West Middlesex Company also have a Bill, as mentioned at their half-yearly meeting. Taken altogether, there is a busy time coming in respect to the London Water Question, and the County Council are preparing themselves for the fray by liberal drafts on the ratepayers' purse; the Parliamentary Committee asking for a supplementary vote of £7000 in consideration of expenses to be incurred in the promotion of the Welsh scheme. The Water Committee, in a similar fashion, ask for another £1000, in consideration of analyzing the water and gauging the pressure in the mains. The manner in which public authorities have dealt with the London Water Question will read at some future time like a romance.

One portion of the able and incisive address which Mr. Boulnois delivered at the half-yearly meeting of the West Middlesex Company last week was particularly striking. We allude to the forecast of the position in which the Metropolitan Water Companies would be placed if the Legislature, by some untoward mischance, were to pass the County Council's Purchase Bill with the clause making the property of the Companies that of the Council in six months after the passing of the measure. The shareholders are promised that they shall suffer no loss of income during the interval between the seizure of their property and the settlement of the price to be paid for it. But, as Mr. Boulnois showed, there is no security in such a case against loss of capital. At the end of the six months, the Council would be in a position to seize not only the works of the several Companies, but likewise the books, together with the staff. The Directors would be virtually "bundled into the street," and the shareholders would be left defenceless. The Council would have full play to shape everything after their own will; and undertakings which cost millions would be at the mercy of an arbitration shackled with unreasonable and confiscatory stipulations. It is inconceivable that such a transaction can ever take place under the authority of Parliament. The audacity of the attempt ought to ensure its defeat. Supposing the Bill to pass its second reading, Mr. Boulnois cannot imagine that it would be approved by any Committee to whom it might be referred. As for the attitude of the Companies, little explanation is necessary. Throughout the period of their existence the County Council have opposed every Bill by which the Companies have sought to improve or extend their supply. Arbitrary and hard conditions have been imposed; and language of a most unjustifiable character has been employed against the Companies—the attack being especially virulent against the Directors. Certainly, this was not the way to win the confidence of the Water Companies, or to draw them into negotiations. Sir Arthur Arnold, who treated the Companies courteously, saw reason to hope for a friendly settlement; but he found that any project of this kind was perilous to his own position in the Council. A regard for the consumer is put forward as a reason for hostility to the Companies. But it is impossible to conceive that the interests of the consumer are promoted by a policy which hinders every attempt to make the supply more abundant and secure. It is perfectly easy to foresee the opposition of the Council when the West Middlesex Directors apply to Parliament in the coming session for power to lay a big main between the Company's works at Hampton and the reservoirs at Barnes and Barn Elms. Anything by which the Companies can benefit the consumer is especially distasteful to the Council, who prefer that the consumer should have a grievance, and who have a great dread of seeing the efficiency of the existing works maintained, fearful lest the undertakings should some day command a higher price because increased in value. But why are they so confident that the bargain will rest with them?

The Cost of Acetylene Lighting in France.—It is estimated by the acetylene gas companies in France that a cubic metre of acetylene gas costs 2 frs.; but as the light-giving power is fifteen times that of ordinary coal gas, the same unit of light is obtained with a consumption of acetylene fifteen times less than that of ordinary gas. Consequently, taking 30 c. as the price of a cubic metre of coal gas, there results, according to this calculation, an economy of lighting power of 50 per cent. in favour of acetylene.

Adapting Oil-Lamps for Gas.—The last number of "Le Gaz" contains an illustrated description of an appliance invented by M. Devinat for rendering oil-lamps useful for the consumption of gas. A metal cap, cut with two screw-threads—one at the bottom to fit ordinary lamps, and the other at the top to take the gas-burner—has at its side a supply-tap to which can be attached an india-rubber tube connected with the fittings. In this way the lamp is readily utilized for gas; and the appliance can be easily detached when oil lighting is reverted to.

Professor Lewes on Acetylene.—At the Society of Arts last night, Professor Vivian B. Lewes, F.I.C., F.C.S., gave the first of the series of lectures on "Acetylene" which, as already announced in the "JOURNAL," are to form the opening course of Cantor lectures for the present session. The lecturer dealt in his peculiarly attractive style with the history of acetylene, its methods of formation, and its chemistry; and he then proceeded to show the important part it plays in flames. We shall deal with the lecture, which was illustrated by several experiments, at greater length in a subsequent issue. Next Monday, Professor Lewes will discourse upon the commercial production, the carriage, and the storage of acetylene.

Deep Artesian Tube-Well in London.—At Sir J. Causton and Sons' new printing works in the Clapham Road, a 15-inch internal diameter tube-well has been sunk through the following strata to the depth of 425 feet: Top soil, 8 feet; gravel, 20 feet; London blue clay, 77 feet; black pebbles, 1 ft. 6 in.; greensand, 3 feet; bed of shells. 1 ft. 6 in.; dead grey sand, 10 feet; mottled clay, 6 ft. 6 in.; loamy sand, 5 ft. 6 in.; hard mottled clay, 14 ft. 6 in.; congealed peebles, 3 feet; greensand with black pebbles, 6 ft. 6 in.; greensand, 5 feet; hard grey sand, 9 feet; dark green sand, 11 feet; dark grey sand, 13 feet; black flints with chalk, 225 feet; hard grey chalk, 5 feet. The tube-well is all the more remarkable as the yield obtainable is 840,000 gallons of water per day—more than has yet been obtained by a single well in any part of London. A novel feature in this instance is the raising of the water, which is done by means of compressed air, dispensing with all pumping and complicated machinery. Messrs. Isler and Co. are the engineers.

Manchester District Institution of Gas Engineers.—The 116th quarterly meeting of the Institution is to be held at Bradford next Saturday, under the presidency of Mr. W. S. Haddock, of Warrington. We learn from the programme issued by the Hon. Secretary (Mr. S. S. Mellor, of Northwich) that on the arrival of the members they will find conveyances waiting to take them to the Frizinghall Chemical Works of the Corporation, which they will inspect by permission of the Gas Committee. Opportunity will thus be afforded of seeing the process there carried on of making muriate of ammonia from ammoniacal liquor. At the close of the visit, luncheon will be served at the Midland Hotel, in the reading-room of which the business of the meeting will be transacted. This will comprise the election of a member and of the President for the ensuing year, and discussions on the subjects of "Meter-Unions," "Purification," and "The Balance-Sheet." The first-named question will come before the members on a resolution; the others will be introduced by Mr. R. G. Shadbolt, of Grantham, and Mr. J. H. Brearley, of Longwood, respectively. The members will afterwards take tea together.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 1182.)

BUSINESS on the Stock Exchange last week was rather colourless. People have recovered to a great extent from their nervousness; but their long indisposition to launch into anything like enterprise still seems hard to throw off. Decided quiet has thus ruled the markets. But, in spite of this, the tendency was all in favour of higher figures; and prices in pretty well every department show an advance. This would have been better still but for movements in the Money Market, where, after five days of ease, the tightness of money in Berlin operated as a sharp astringent at the close. How far this may affect us is a matter of uncertainty; but it is fair to hope that the 4 per cent. Bank rate may be good enough to carry us through. Business in the Gas Market, which was really beginning to pick up a little, fell quite quiet again as if in sympathy with the other markets. There was no decided characteristic beyond the negative quality of nothingness. Two or three quotations receded, but only in consequence of special circumstances affecting them; and all the rest may be written down steady. In Gaslights, the "A" opened and closed at about 288; and all through the week prices ranged only fractionally above or below this figure. Nothing at all was done in the secured issues, except to restore to the 10 per cent. the point which was knocked off it during the previous week, and to draw the "G" quotation in closer. South Metropolitan was moderately dealt in. The tendency was somewhat uncertain; the best and the worst prices of the week being marked on the closing day. Commercials were quite untouched. Letters of allotment of the new capital issue were sent out to the proprietors on Saturday. In the Suburban and Provincial Companies, business was just as slack as in the others; and the only change was a further fall in British. Among the Continental undertakings, Imperial and European were steady and unchanged; but Union had a fall, in view of the approaching reduction in the dividend—a reduction rendered inevitable by the large falling off in the profits of the French Company, in which the Union is a large proprietor. Among the rest, a rise in River Plate was the only incident. Water was quiet and unchanged, except for a slight fall in New River. At the Mart, however, on Wednesday, some New River shares realized prices averaging a little above the quotation.

The daily operations were: Business in Gas was very moderate on the opening day; and prices showed no change. Gaslight "C," "D," and "E," recovered 1. Tuesday's transactions were even a little quieter; and prices again ruled steady. River Plate rose ¼. Wednesday was much about the same; marked prices still showing no variation. But the quotations of Continental Union receded 2; ditto, preference, 3; and British, ½. Thursday was quite a slack day, without any incident at all. On Friday, the quotation of Gaslight "G" was drawn closer, involving practically neither loss nor gain. In Water, the buying price of New River was lowered 5. Saturday was quiet, and devoid of change.

ELECTRIC LIGHTING MEMORANDA.

A Statement of Accounts Relating to the First Year's Working of the Shoreditch Vestry Combination Plant—Criticisms—Grave Accusations.

ACCOUNTS relating to the first year's working of the Shoreditch Vestry electric lighting and dust destroying undertaking have been issued; and, of course, the statement is hailed by "London" as confirming the wisdom of the policy represented by this venture. The revenue account takes credit for electricity "sold to consumers" to the value of £8254, besides current "sold to dust destructor," £536. Miscellaneous receipts bring up the gross income to £9041. On the other side, working expenses charged amount to £3214; and interest and redemption, to £2641. This leaves a net "profit" balance of £3184, which our municipal contemporary unreservedly characterizes as "very satisfactory." With regard to the dust destructor part of the concern, the accounts show a saving of £1253 on the old cost of barging the refuse; but there is a debit balance against the destructor of £1758 which has to be set off, thus bringing out the "net profit and saving" at £2679 for the year. This looks mighty well; but the presentation of the accounts to the Vestry was not attended with that triumph for the Committee responsible for them which those gentlemen doubtless expected. Indeed, one recalcitrant vestryman declared that the accounts were "cooked;" and though the Chairman of the Committee "warmly repudiated this imputation," he appears to have subsequently admitted that the destructor plant had not done all that was expected of it. A curious feature of these proceedings, mentioned by the "Electrical Review," is that "the accounts are so highly satisfactory that no one feels it incumbent to append his signature to them."

Seeing how much fuss has been made over this Shoreditch scheme, and how anything that could be charitably interpreted as confirming the promises of those responsible for it is certain of advertisement far and wide, it will strike most people that "London" might at least have made sure that these "satisfactory" accounts are reliable. As it is, we must caution our readers against taking the partial and imperfect report published in "London" as trustworthy. The report published in the current number of the "Electrical Review" is much fuller; and it is to be noted that both the leading electrical journals express the utmost reserve as to accepting the figures and statements of the Vestry Committee. It is worse than folly for a professed organ of Progressive municipalism to garble reports of the proceedings of Local Authorities with the object of keeping up a delusion certain to be exposed later, or to profess to regard as good evidence accounts which are not in the proper form and have not even been audited. Will it be believed that what "London" acclaims and describes as "the complete accounts for the first year's working of the combined dust destructor and electric lighting scheme," are not by any means "complete"? The accounts, such as they are, had not been forwarded to the Board of Trade; they were not in the detailed form prescribed by the Board of Trade; the charge for the public lighting is not disclosed; the Accountant to the Vestry disclaimed responsibility for them; and nobody knows who prepared them. When they were brought before the Vestry, one of the members flatly described the balance-sheet as a false one.

Mr. H. E. Kershaw, the Chairman of the Lighting Committee, has been advertised as the prime mover of the Vestry throughout this business. He has now been reminded that at the opening ceremony he promised that there would be a saving of £2200 a year by burning instead of barging the parish refuse. The Chairman of the Wharf Committee, who ought to know, contradicted the statement in the accounts that there had been a saving in the manner of disposing of the refuse. The destructor costs the parish more than the wharf. He proved the assertion by details. Whereas under the old system 14 vans daily in the summer and 20 in winter sufficed; for the present financial year the Vestry are employing 20 vans summer and winter. They had had to purchase additional horses, pay extra wages for 12 men, and provide further rolling stock; and the total expenditure amounted to £1712. "Before the dust was sent to the destructor, the wages paid annually were £315 less than they were at present." Moreover, the Lighting Committee did not want, and had not been able to use, the refuse sent to them, but had sent it to the wharf, and bought coal instead. Another vestryman stigmatized the alleged profit as "bogus;" and others wanted to know where the money was. In reply to criticisms, Mr. Kershaw admitted that his promise at the opening of the station had proved to be "erroneous." He offered numerous excuses for the shortcomings complained of, and is reported to have made the following statement: "The figures had been submitted to the Accountant, and he audited them." Thereupon "Mr. Ernst A. R. Adams, the Accountant, in reply to the statements made by Mr. Kershaw, said that he had not audited the accounts. The latter were sent to him to look over, with instructions not to make any alterations." It is evident that this matter cannot end here, though the Vestry eventually adopted the report. According to Mr. T. W. Baker, an outside critic of the Shoreditch Vestry performance, the utmost profit balance on the combined scheme, even according to the uncertified figures of the Electric Lighting Committee, is £344, without providing for depreciation or bad debts, full expenses of management, rates or taxes. The increased cost of the public lighting appears to be £1718 a year; and in order to lighten the charges upon the combined scheme, a sum of £1435 a year, for interest and repayment of the capital cost of the dust destructor, is paid out of the general rate, and not borne by the special undertaking at all. We all know what would be said of a company who conducted their finances in this fashion; but, of course, in the cause of Progressive Municipalism much is to be permitted.

PROGRESS IN THE LIGHTING INDUSTRIES.

BERLIN at the present time is an excellent centre from which to observe the progress of the several great lighting industries; and Dr. Lux, the Editor of the "Zeitschrift für Beleuchtungswesen," has profited by the opportunity which residence in the city affords him to make some instructive comparisons. His words are the less likely to be tinged with bias, because his journal caters for all branches of the lighting industries; and one section or other of his heterogeneous array of readers would forthwith take him to task if his opinions could not be justified by reference to hard facts.

Recent events in Berlin, it is pointed out by him, have certainly afforded much food for reflection. A deputation which had been instructed to advise the Municipality whether an alteration in the charges for gas was practicable, and, if so, what should be the nature of the change, have presented their report. The price of gas supplied for illuminating purposes has for some years been 16 pfennige per cubic metre (4s. 6½d. per 1000 cubic feet); and that of gas for heating and industrial uses, 10 pfennige per cubic metre (2s. 10d. per 1000 cubic feet). The recommendation of the deputation is to the effect that in future there shall be but one price for gas in Berlin, and that this shall be 12 pfennige per cubic metre (3s. 4¼d. per 1000 cubic feet). Now

as the gas sold for lighting hitherto has amounted to more than three times that sold for other purposes, the projected alteration means a very considerable reduction in price to a large majority of the consumers. Especially does it tend to place gas in a better position to compete with other illuminants. A reduction to three-fourths the former charge is bound to be appreciated by the gas consumers of a large city. For instance, how great an impetus gas lighting in London would receive if The Gaslight and Coke Company at one step reduced their present price of 3s. per 1000 cubic feet to 2s. 3d. Nor is the reduction in the price of gas the only benefit which is now promised to gas consumers in Berlin. The price of Welsbach mantles has been reduced to 6d.; and mantles for incandescent lighting are sold by other companies than the Welsbach at four-fifths this price. Self-lighting mantles, costing 1s. 6d. apiece, are about to be introduced; but it is doubtful if they will compete successfully with other automatic-igniting devices which may be used with the ordinary mantles.

But cheaper gas and cheaper mantles cannot fail to be the precursors of an unprecedented advance in the use of gas in Berlin—unless, indeed, the rival lighting industries are simultaneously offering equal or greater benefits to consumers. Let us, with Dr. Lux, glance at the immediate prospects of electric lighting. No considerable improvement in electric lamps can be observed; and except for the recent production of high-voltage lamps, there would be absolutely no advance to chronicle. The high-voltage lamps are said to effect a saving of one-third the current; but this saving is as nothing compared with the economy of gas which the Welsbach mantle effects. Moreover, there are no indications in Germany that these lamps will be at all widely used. Dr. Nernst has proposed to replace carbon filaments by electrolytes; but there are no signs that either his or Dr. von Welsbach's electric lamps will be of any practical utility yet awhile. Electric lighting technically stands in much the same position that it has occupied for several years past. It has no new inventions whereby it may keep pace with the immense strides which incandescent gas lighting has made during the last decade. Acetylene lighting does not even pretend to compete with ordinary gas in towns. The only important illuminant which remains is petroleum. Its application for lighting purposes has remained virtually unaltered in recent years; while the machinations of the oil-rings are fast deposing it from its vaunted position of being the cheapest of all possible illuminating agents for domestic use.

Berlin, therefore, teaches us one lesson before all others with regard to the lighting industries—viz., that the gas industry is the only one which is truly progressive at the present time. Electricity and oil can offer nothing to the consumer which is a considerable advance on what they could give him some years ago. With gas, it is otherwise. The incandescent system is developing potentialities in gas lighting which ten years ago would have been regarded as utterly unrealizable; and the most inveterate pessimist would not venture to prophesy that the climax in incandescent gas lighting has yet been approached. Moreover, while the illuminating duty of gas-burners is advancing by leaps and bounds, the manufacture of gas is also progressing apace. The improvements in the means for handling and carbonizing coal have cheapened the production of coal gas; and at the same time the alternative of producing illuminating gas by water-gas processes is at the option of gas engineers. Gas can now be made at a greater speed, on a smaller area, and by fewer hands, than at any earlier period; and the consumer must eventually reap the advantages of these improvements in the technology of gas manufacture during the closing years of the nineteenth century.

It must not, however, be assumed from the foregoing that electric lighting is on the decline in Berlin. The Company who supply current to the city report an increase of 17·2 per cent. in the number of incandescent lamps served during the last working year. To what extent this increase is due to the fact that the electric light is a private enterprise, while the greater part of the gas supply is in the hands of the Municipality, it would be difficult to determine. The projected reduction in the price of illuminating gas is causing some stir among the electricians in the city; while the question of the extension of the Electrical Supply Company's contract has given occasion for an ample discussion in the Municipal Council as to the general merits of private and municipal control of lighting undertakings. A majority of the Council, when the question of the electric lighting contract was put to the vote, proved to be in favour of private enterprise. Among the arguments in support of this view may be mentioned one drawn from the successful competition of the Imperial Continental Gas Association with the Municipal gas-works in certain quarters of Berlin. The Association have attracted customers from the Municipal supply, not by offering gas at a lower price, but by giving free the service-pipe to the meter and by letting fittings on hire. In a word, the Association have proved more accommodating than the Municipality, and have thus captured many consumers. On the other hand, it is not to be denied that many of the municipal gas and electric light undertakings in Germany and Switzerland are excellently administered. The projected reduction in the price of illuminating gas in Berlin is an indication that in this city gas will in the future be allowed better opportunities of proving its intrinsic merit and economy as an illuminant in the homes of both poor and rich alike.

A FRENCH VIEW OF SOCIALISM AND ENGLISH TRADE UNIONS.

A book by a French author, bearing the remarkable title "A quoi tient la Supériorité des Anglo-Saxons," is likely to arrest attention at home and abroad. An English translation of the book has just been published, with the title "Anglo-Saxon Superiority; to what it is due;" and as the work is really a study in social, industrial, and political economy, we propose to give readers of the "Journal" the privilege of seeing themselves, as busy Englishmen, from the standpoint of a French observer.

A good deal of the book is outside our province; but an important section of it is devoted to a criticism of the influence of Socialism upon English working people of every degree; and this cannot but be interesting to the subjects of the study. We in England hear a considerable amount of socialistic chatter, chiefly in connection with what are called "Labour" politics. Very little else is talked at our Trade Union Congresses; and there are in the humbler walks of English public life a few politicians who would persuade the rest of the world that the communistic solution of the Labour problem, whatever it is, is the only possible one. It comes as a bracing piece of intelligence, therefore, when M. Edmond Demolins, the author of the book now in question, not only assures his readers that "the Anglo-Saxons are more hostile to Socialism than the Germans and the French," but shows conclusively that the race is not susceptible to this contagion. In comparison with the Continental peoples, the English and American nations are immune as regards the plague of Communism in all its forms and developments. We have our John Burns and Keir Hardie; but they are sporadic, not representative of anything truly national.

M. Demolins points out that Socialism is essentially a product of German origin and manufacture. Its centre of formation is in Germany; and from Germany it has permeated the world. Here it is to be met with in all classes. Taking all the varieties together, Socialists form the majority of the German Parliament. These different sects, of course, have various programmes and aims; but they all agree upon the test-principle of the necessity for referring all social and industrial questions to the action of the law, or the State. "All dream of a Society in which the State should regulate and organize more or less labour, property, salaries, and should take upon itself to make happy one and all by playing the *rôle* of a great universal employer. The State is the new Providence found by Socialism." The apostle of the communion was Karl Marx, who taught that labour alone is the real measure of value of goods. Capital is consequently the product of labour only. Hence capital, as it actually exists, is the result of spoliation. The only remedy is the return of all capital, free or invested, to the State, and the constitution of the State as the universal employer of labour and distributor of every kind of produce.

The idea has taken hold of the public mind of Germany as it has nowhere else. Germany is tainted with Socialism from top to bottom; so that all the tremendous military and industrial forces of the empire are penetrated through and through with an influence that means in the end the paralysis of all individual effort. M. Demolins undertakes to supply the reason for this portentous condition of the German body politic. It is because the German Empire has been erected as an absolute central power over the ruins of provincial and local life. At the present time, Germany is entirely Prussian; and to be Prussian, is to be in the hands of the State. In point of fact, the Prussian State has long been applying the principles of contemporary Socialism. "The great social barracks; the intricate and encroaching bureaucracy which form its ideal, are in many points very much like what Socialists dream of, and which they call the Society of the future." Very little more is needed to render the terms Prussian, and communistic, convertible descriptions of governmental forms. Consequently, the much-governed German people had little difficulty in conceiving of such an extension of their officialism as would make everybody an official of a Communistic State. "The middle class and nobility were quite as well prepared for accepting this solution as the people themselves. The Prussian system, indeed, by developing *à outrance* militarism and officialism, first crushed them, and then instilled in them a disposition to consider the State as the unique source whence everything in social life emanates." In France, militarism and officialism are rampant, but not yet to the same degree as in Prussia. So far as they go, however, these influences, by destroying individual initiative, prepare the community for Communism. And wherever it is found, Socialism is admittedly and notoriously of German origin.

When the idea came to England, there was at first no soil proper for it to root in. A few "faddists" like the late poet William Morris, and Mr. H. M. Hyndman—"whom nobody listens to seriously"—took up with it; but for a long time it did not go any further. An acute foreign observer at this period recorded his opinion that "the English are essentially individualists. They want to be left to manage their own affairs in their own way. They object by temperament to any enrolment, to any surrender of their own personal rule of conduct to some common action. Such is, I believe, one of the reasons which makes them hostile to Socialism." Yet in England, as well as in the United States, though the dominant Anglo-Saxon race was

observed to resist Socialism "as the American vines resist the phylloxera," there were a few recipients of the message found in the persons of Germans and Irish. The Anglo-Saxon spirit was, and is, deeply antagonistic to the Socialistic idea. The Anglo-Saxon always did, and always will, govern himself. With the German, the powers of the State have assumed an importance to which the Anglo-Saxon is a stranger." Germany is the greatest contemporary centre of authority; the Anglo-Saxon world is the greatest centre of self-help and self-government. The attraction of Socialism for the Irish is to be found in the path it opens to a political career.

So far M. Demolins. It is quite unnecessary to follow him though the details of his demonstration that German Socialism supplies no better solution of the labour problem than Anglo-Saxon "Particularism;" but the proof is worth reading in the text. What we wish to reproduce is his conclusion that "the more a man obeys an inclination to rely on help from others, from the community or the State, the less is his force of initiative developed, the less is he inclined to exert himself personally to make a livelihood. . . . The *régime* of Communism places man in a general situation which may be likened to that of administrative clerks or officials—and we know that such situations do not develop the working power. . . . Always and everywhere the communistic system has resulted in confining within narrow limits the scope of human industry, in promoting impotence, and maintaining inferiority."

When the socialistic missionaries first came to England from Germany, they discovered, to their astonishment and discomfiture, that the Anglo-Saxon workmen declined to let themselves be "enrolled or led." This was largely because the same workmen had already, with the "forehandedness" of their race, which is so justly irritating to foreigners, organized themselves in a variety of ways. They had their provident clubs, their mutual assistance societies, their co-operative system, and their trades unions. Consequently, the earlier German Socialists, with their one idea of State interference with all that man does from his cradle to his grave, confessed themselves non-plussed in face of so much spontaneous activity on the British workman's part. M. Demolins rightly acclaims all this helping of themselves by the British working classes as radically opposed to Socialism. He enumerates the Trade Unions as particularistic and capitalist institutions. These trade societies, as the German Socialist emissaries found them in England, were "not like the German associations, tending to become international, or even only national affairs, with the ultimate aim of embracing the workmen of the whole world and undertaking to build Society anew. "They were purely trade societies, composed of workmen having a common calling, but only united in view of one distinct and limited end." Thus constituted, the English Trade Union was for its members a source of moral discipline, as well as a means of progress.

M. Demolins' mistake is in ignoring the change that came over English Trade Unionism, and first became manifest in 1889, when the so-called New Unionism showed itself. He does not seem to be aware that what the German socialistic missionaries failed to achieve, their local converts afterwards succeeded in accomplishing only too thoroughly. The British workman was not going to be fooled by the German dreamers of a communistic millennium; and while the prophets of this cult confined themselves to street-corner oratory, and to holding meetings in small temperance halls, they remained an out-at-elbows fraternity. Then, by a happy inspiration, one or other of them hit upon the policy of "permeation," and proceeded to carry it into effect. Putting their Socialism into their pockets, they insinuated themselves into the weaker Trade Unions, and got elected to Local Authorities of poor neighbourhoods. Once in positions of some influence they increased their notoriety by every means within their reach, especially by adroitly cultivating the art of self-advertisement. The result has been to change the aspect of those Trade Unions that came into the control of these masquerading Socialists. When they felt themselves firmly seated in the saddle, these gentry threw away the mask and proclaimed the new doctrine that Trade Unionism is one with Socialism. Hence we have in England at the present time, as developments of Trade Unionism, all those features which M. Demolins notes as absent from the old Particularist organizations which baffled the German Socialists. He remarks of the old Unions: "They do not form an immense machine placed in the hands of a few leaders, who work it for their own greater glory." What of the Trades Councils, and the Trade Union Congress? He quotes another witness as testifying that the old Unions "have remained animated with a spirit of professional independence, which has resisted every attempt at a general federation or joining together of the activity and resources of all members." But "Federation" is actually "in the air" at present, as a feature of the most advanced Trade Union politics, though there is not much likelihood of its coming to anything practical.

This is our present point. As M. Demolins shows, the old English Trade Unions grew into power and wealth before the irruption of German Socialism into their councils. So long as the Union executives stuck to their business, although everybody might not acquiesce in their ways and approve their objects, they gathered in the best workmen and strengthened their societies in means and influence. When the Socialists got the upper hand, things began to go wrong. Strikes for "principle," collusion with party politicians, the degradation of labour to the "Union stroke," rebellion against the employers' function in management—all these silly and pernicious practices became identified with Trade Unionism, with which they had originally no connection. What has Socialism to offer in return for the solid Trade Union power which it has sapped, after having shown its incapacity for managing it? "Declarations of principles, revolutionary speeches, newspaper articles, and chimerical schemes for overturning Society—while the workmen go on starving." There is no help for the working man in Socialism. It is an essentially inferior formation. "The future undoubtedly is for the nations which have been successful in freeing themselves of communistic tendencies. It would be wise indeed to realize this truth, instead of wasting time in seeking a solution on old played-out lines the impotence of which had already been recognized in the time of the Pharoahs, and which nowadays is chiefly advocated by the most State-ridden nation in the Western World."

ILLUMINATING GAS FROM COKE-OVENS.

THE progress made during late years in the recovery of bye-products from coke-ovens has been from time to time recorded in the "JOURNAL;" and the effects of the competition engendered by this new source of tar and ammonia on the market value of these bye-products of the gas industry are familiar to all gas managers. It has also been known pretty generally that strenuous endeavours were being made, especially on the Continent, to utilize for illuminating purposes the gas evolved during the carbonization of the coal in coke-ovens of modern construction. In a few cases some of the gas is sold to neighbouring gas-works; and as recent developments of the coke making industry in America indicate that steps are being taken to dispose of coke-oven gas for the supply of towns, it may not be inopportune to give an epitome of a paper on bye-product coke-ovens written by Mr. H. O. Hofman for the "Engineering and Mining Journal," in two numbers of which it has lately been published.

The town of Halifax, in Nova Scotia, has for some months been supplied by the People's Light and Heat Company with gas from a block of ten coke-ovens on the Semet-Solvay system. Each oven is 30 ft. in length, 5 ft. 6 in. high, and 16 to 17 in. wide, and has three charging ports and two gas-outlets. Condensing and tar and ammonia extracting plant and gas purifiers are provided. The charge of coal per oven is 5 tons; and it is worked off in 20 hours. The discharging of the block of ten ovens occupies 2½ hours; and refilling, which takes the same time, is not commenced until the discharging is completed. The time between discharging and recharging permits the heats to increase so that coking commences with a high initial heat. A pressure of ½ inch of water is maintained in the ovens during coking; and the temperature is from 1800° to 2000° Fahr. The coal used is washed slack from Cape Breton; and it contains about 60 per cent. of fixed carbon. The portion of the gas which is, according to the readings of a jet photometer, of 16-candle power and upwards, is taken to one gasholder, and has an average illuminating value of 18 candles. It is sold as illuminating gas in the town at a price of $1·40 (say, 5s. 10d.) per 1000 cubic feet. The gas of lower candle power is collected in another holder, distributed by a distinct system of mains, and sold as heating gas at $0·40 (say, 1s. 8d.) per 1000 cubic feet. It has an average illuminating power of 8½ candles. The make of gas per ton of coal averages 9384 cubic feet, of which 32·26 per cent. is illuminating gas, and the remainder heating gas. As, however, 54·84 per cent. of the total make is used for heating the ovens, only 13·9 per cent. remains for sale as heating gas. About 10 gallons of tar and 5 lbs. of ammonia gas are obtained per ton of coal. The ammoniacal liquor is distilled with lime; and a saleable liquid containing 17 per cent. of ammonia is produced. The coke amounts to 75 per cent. of the coal, and is sold at $4 (say, 16s. 8d.) per ton for domestic and boiler use; whereas the price of anthracite is $4·25 (say, 17s. 8d.) per ton. These figures, which are taken from the record of the working in June last, give a fair idea of the procedure followed at present, and of the results obtained.

A scheme of far greater magnitude is now afoot for the supply of gas from coke-ovens to Boston, U.S.A. There are being erected in the neighbourhood of the city 400 Otto-Hoffmann ovens, capable of carbonizing upwards of 2000 tons of coal per day. Mechanical conveyors for transporting the coal and coke, and adequate condensing and purifying plant, are being provided. A gasholder having a capacity of 5 million cubic feet is being erected for the storage of the gas. The coke produced will be of a kind suitable for domestic and boiler fuel, unless a demand arises for blast-furnace coke. Preliminary large-scale trials of the coal which is to be used at Boston have been made at the works of the United Coke and Gas Company, at Glassport (Penn.). The plant at the works consists of four blocks, each comprising 30 Otto-Hoffmann bye-product ovens. Each oven is 33 ft. in length, 5 ft. 10 in. high, and 20¾ in. wide. In ordinary working, 10,000 cubic feet of gas are obtained from a ton of coal. Of this gas, 70 per cent. is used for heating the ovens, and the surplus is conveyed to a steel works 1½ miles distant, for the purpose of heating an open-hearth furnace.

The special trials for the Boston scheme were made in one

of the ovens, which was heated by the surplus gas from the other ovens in the block; but the products were kept apart from those obtained from the other ovens. In one series of trials, 40 tons of washed slack from Cape Breton were dealt with. It had been exposed for some months to rain and snow, and contained the unusually high proportion of 9·9 per cent. of water. A charge was worked off in 33 hrs. 56 mins. which gives 5 hrs. 35 mins. as the average time occupied in coking the amount of this coal equivalent to a ton of dry coal. The temperature of the oven ranged from 1750° to 1960° Fahr. The yield of gas per ton of coal was 10,390 cubic feet; and the specific gravity of the gas was 0·466. Of this gas the first 49·5 per cent. was not necessary for heating the oven; and this portion had the following composition in volumes per cent.: Marsh gas, 38·7; hydrogen, 38·4; nitrogen, 7·7; carbonic oxide, 6·1; olefines, 5·2; carbonic acid, 3·6; and oxygen, 0·3. Its specific gravity was 0·510. It had an illuminating power of 14·7 candles, and a calorific value of 686 B.T.U., assuming that the water in the products of combustion is condensed to the liquid state. About 66·69 per cent. of the weight of the dry coal was recovered as large (exceeding 1 inch in diameter) coke; 1·64 per cent. as small (½ inch to 1 inch) coke; and 2·80 per cent. as breeze (less than ½ inch). Only the large and the small coke are marketable; and if the 2 per cent. of water usually present in commercial coke is added, the amount of saleable coke becomes 69·70 per cent. of the coal carbonized. The coke contained 8·91 per cent. of ash and 0·0041 per cent. of phosphorus. Extended trials of the coke from this description of coal in blast-furnaces, and a large number of analyses, showed that the amount of sulphur in it, though variable, was on the average low. The ash contained 50·60 per cent. of ferric oxide, 27·71 per cent. of silica, and only 1·03 per cent. of alkali. But as the iron was derived mainly from pyrites, it could be to a large extent eliminated; and the percentage of alkali would thus be increased, and an ash not liable to form clinker would result.

The tar obtained amounted to 3·38 per cent. of the weight of the dry coal, and had a specific gravity of 1·170. A fractional distillation of a sample gave the following products in volumes per cent.:—

Water	2·3
Light oil (176° to 338° Fahr.)	3·7
Middle oil (338° to 446° Fahr.)	9·8
Heavy oil (446° to 518° Fahr.)	12·0
Anthracene oil (above 518° Fahr.)	4·3
Pitch (specific gravity, 1·350; softening point, 188½° Fahr.)	67 0
Loss	0 9

These figures indicate that the tar compares favourably with that derived from gas-works and other coke-ovens. The yield is, however, lower than would be obtained from the same coal in gas-works.

The gas liquor obtained amounted to 8·17 per cent. of the weight of the dry coal, and it contained ammonia equal to 0·34 per cent. Of the ammonia in the liquor, 96·6 per cent. was "free," and could therefore be recovered by simple distillation. The coal carbonized contained 1·51 per cent. of nitrogen; and therefore 18·5 per cent of the nitrogen in the coal was converted into ammonia—a better yield than is usually obtained.

The sulphuretted hydrogen in the crude gas amounted to 686 grs. per 100 cubic feet, and the carbon bisulphide to 91 grs. per 100 cubic feet. Samples of the gas taken at intervals of two hours were analyzed, in order to observe the changes in composition throughout the process. The average composition of the gas produced in the first 14 hrs. 46 mins. after charging, amounting to 49·5 per cent. of the total make, is given above. The heating gas, amounting to 50·5 per cent. of the total, produced in the last 19 hrs. 10 mins., had the following average composition in volumes per cent.: Hydrogen, 50·5; marsh gas, 29·2; nitrogen, 9·1; carbonic oxide, 6·3; olefines, 2·4; carbonic acid, 2·2; and oxygen, 0·3. Its specific gravity was 0.421; its illuminating power, 9 candles; and its calorific value, 566·7 B.T.U. The results of the periodical analyses, and photometric and calorific tests of the gas, and of the observations of the volume of gas made at the different periods, indicate that three periods in the process of coking can be distinguished.

The first period is of nine hours' duration; and during this time the calorific value, and specific gravity decline, while the candle power drops from 18 to 13½. The second period extends from the ninth to the twenty-second hour; and the properties and quality of the gas remain almost constant throughout it. The third period extends to the close of the process at 33 hrs. 56 mins. from the time of charging. During this period the quality of the gas declines very rapidly. The gas might be advantageously separated according to these three periods, and applied thus: That made during the first period should be purified and used for illuminating purposes; that made during the second period should be used for heating the ovens; and that made during the last period should be purified, and then enriched with benzol or oil gas, and mixed with the gas of the first period. The gas of the last period is very rich in hydrogen; and it therefore forms an admirable carrier of hydrocarbon vapours.

The amount of gas used to heat the oven was measured, and its calorific value was ascertained. The heat required for the coking of 1 ton of coal was computed from these data, and compared with the calorific value of the gas produced at different periods. It appeared that up to, and including, the twenty-ninth hour, the gas produced would more than suffice for heating the oven; but that if coking was prolonged after this period, the gas then produced would need supplementing by other fuel. If the coke were needed for domestic use only, coking could be interrupted at the 29th hour with advantage. Though three periods in the process of coking may be distinguished, it is simpler in working to separate the gas into two varieties only, as indicated by the analyses already given. The one, amounting to 49·5 per cent. of the total volume of gas, may be used for illuminating purposes; while the remainder will supply the heat required by the ovens. The heat needed for evaporating the 9·9 per cent. of water in the coal in question amounts to 8·3 per cent. of the total heat required for coking. The importance of using drier coal is thus clearly shown.

A coke-oven can be successfully heated with producer gas; and when the consumption of illuminating gas is great, it would pay to heat the ovens with producer gas and collect the whole of the coke-oven gas in one holder, and enrich it to the extent necessary to make it available for illuminating purposes.

The economy of the coke-oven process may be seen by striking a heat-balance by tracing the calorific value of the coal through the products of its distillation. A similar heat-balance has been given by Herr W. von Oechelhaeuser for German coal carbonized in gas-retorts. The results are shown in juxtaposition in the following statement of the distribution of the heat contained in 100 lbs. of dry coal:—

	German Coal in Gas-Retorts. Per Cent.	Cape Breton Coa in Otto-Hoffmann Ovens. Per Cent.
In saleable coke	46·4	72·3
„ coke for heating retorts	10·1	..
„ tar	5·5	4·1
„ saleable gas	21·0	12·7
„ gas for heating ovens	..	10·7
„ gas liquor, sulphur, and loss	17·0	0·2
„ Heat used or lost in the distillation	27·1	10·9
„ Heat contained in the products	72·9	89·1

The economy of coke-oven practice compared with retort-house practice is thus very marked.

Mr. H. O. Hofman concludes his paper with the remark that "from the standpoint of chemical and thermal analysis, the production of illuminating gas in bye-product coke-ovens is upon a very sound basis; and much could be added to prove that this is equally true from a financial point of view." The data he gives are certainly very interesting, and show that an investigation of the course of carbonization has been made at Glassport which is of a more exhaustive and complete nature than any single investigation of carbonization in gas-works which we can call to mind. We look forward with great interest to the fruition of the enormous scheme which is about to be carried into effect for the supply of the city of Boston with coke-oven gas. The chief obstacle to the success of such a scheme is the great fluctuations in the demand for gas.

The Output of Coal and Iron in the Past Year.—According to the recently-issued report of Dr. C. Le Neve Foster on the output and value of minerals raised in the United Kingdom in the past year, the output of coal was 202,129,931 tons, while the imports were 37,000,000 tons—in both cases the highest quantities on record. The output of iron ore reached 13,750,000 tons.

The Recent Incandescent Gas-Light Litigation.—We understand that the New Incandescent (Sunlight Patent) Gas Lighting Company, Limited, have instructed their Solicitors to appeal from Mr. Justice Romer's decision, reported in another column, with reference to the De Mare patents, which the owners of the Kern patent burner claim to have purchased, subject to equal user-rights to the Sunlight Company. The Company are, we learn, on the point of bringing out a burner, under the above-named patents, for which they claim at least equivalent results to those achieved by the Kern burner.

Projected Mining and Industrial Exhibition in Western Australia.—It has been decided to hold a Mining and Industrial Exhibition at Coolgardie next year, and the Government of Western Australia will substantially support the undertaking by a money and land grant. The exhibition will be opened on the 21st of March, and remain open for at least three months. There will be seventeen groups of exhibits; three being devoted to gas and lighting (other than electricity), heating and cooking appliances, and prime movers. The Special Commissioner is Mr. E. T. Scammell, 18, Queen Victoria Street, E.C.

The German Coke Industry.—According to an article in "Stahl und Eisen," the production of coke in Germany since 1890 has increased by more than 3½ million tons, or by 55 per cent. This is exclusive of the coke produced in North German and Rhenish Westphalian works and in various cement factories. If all other coke were included, the total production of Germany would for 1897 be certainly about 12 million tons. It is in the Ruhr district that the chief coke production occurs, which shows a development from 341,033 tons in 1870 to 5,562,503 tons in 1895. The value has risen from 21 million marks in 1885 to 76 millions in 1897, or by 262 per cent. Of the estimated 12 million tons of coke turned out in 1897, about 9 millions remained in the country and only 3 millions went abroad, which, however, includes Luxemburg.

THE "ROBERT HUNTER FUND."

Second List of Contributions.

We have pleasure in acknowledging to-day further amounts received for the benefit of the widow and family of the late Mr. Robert Hunter, of Chester. As it is most desirable that Mrs. Hunter may, without much further delay, know on what she will have to depend in establishing herself in any business she is likely to undertake, a prompt response to the "Journal" appeal from those who intend to contribute is much desired. The sums received to date are as under—

SECOND LIST.

	£	s.	d.
Amount already acknowledged	72	11	0
An Old Friend	15	0	0
Braddock, Mr. Joseph, Oldham	5	5	0
Davis, Mr. Joseph, Gravesend	2	2	0
Livesey, Mr. George, Reigate	10	0	0
Marsh, Mr. T. G., Willesden	5	5	0
Mobberley and Perry, Stourbridge	1	1	0
Ritchie, Mr. James, Middlesbrough	5	5	0
Stanton Iron-Works Co., Nottingham	1	1	0
Woodward, Mr. John, Manchester	1	1	0
	£118	11	0

OBITUARY.

Mr. Thomas Howden, of Wakefield, died on Monday last week, after a long and painful illness. He was Deputy-Chairman of the Gas Company; and prior to the purchase of the water-works by the Corporation, he occupied a similar position on the Board of the Water Company. Deceased, who was 74 years of age, had filled many public positions during the past quarter of a century.

PERSONAL.

Mr. F. J. Bancroft, the Water Engineer to the Hull Corporation, has been voted a gratuity of £100 in respect of his work in connection with the gas undertaking, the first financial year of which will expire next March.

Mr. A. H. Forbes, of Chesham, has been appointed, out of 75 applicants, Borough Surveyor and Manager of the gas and water undertakings at Saffron Walden, in succession to Mr. G. W. Lacey, who, as already mentioned in the "Journal," has secured a similar position at Oswestry.

At St. George's Church, Bloomsbury, last Thursday, the marriage took place of Mr. Maurice Graham with Miss Naomi Edith Edwards, third daughter of Mr. W. Edwards, of John Street, Bedford Row. Mr. J. Morton, with whom Mr. Graham is associated in business, was the best man.

The "Pall Mall Gazette" understands that Colonel Mark Lockwood, M.P., has accepted the chairmanship of the East London Water Company. Our contemporary considers this a "happy coincidence with the decision of the Board to increase its capacities of supply, and gives promise of a reformed administration of the Company."

Mr. J. C. Belton, who a few months ago relinquished his position as Manager of the Redhill Gas Company, under circumstances recorded in our columns at the time, has obtained the appointment of Engineer and Manager of the Chester Gas Company, in succession to the late Mr. Robert Hunter. Mr. Belton took up his duties yesterday.

On Friday, the 11th inst., the Chemical Society gave a banquet in honour of six of the Past-Presidents who had been for more than half a century fellows of the Society. It is interesting to note that three of them—Sir E. Frankland, Professor Odling, and Dr. A. W. Williamson—have for a large portion of the above-named period occupied conspicuous positions in connection with the two important industries with which the readers of the "Journal" are associated.

NOTES.

Professor Ramsay on the Discovery of the New Gases.

Professor W. Ramsay has discoursed to the Pharmaceutical Society on the subject of the new gases of the atmosphere. He described the discovery of argon, as first published at Oxford in 1894. The atomic weight of this gas was about 40, and that of helium, discovered later in the gas given off by Cléveite, was about 4; so that between these two there was a vacant space in the periodic scheme of the elements. Professor Ramsay narrated how the search for the missing number was carried on in all sorts of possible sources, until the use of liquid air enabled argon to be liquefied. Not only so, but when the spectrum of the residue of boiling liquid air was examined, the spectrum of crypton revealed itself. When liquid argon was allowed to evaporate, the portion that boiled off first was found to have a new spectrum. On this lighter portion being collected and cooled, some of it refused to liquefy; and this portion, which had a density of about 10, was the missing element. This gas was named neon; and as it contained some argon and helium, the problem arose how to separate it from these substances. Ultimately a process of fractionation was applied. The portion which boiled off last from the liquefied argon was also examined, and discovered to be heavier; hence the substance originally called argon was a mixture, though the bulk of it was true argon. This heavy portion had also a distinctive spectrum and a density of 32·5. There happens to be room in the periodic table for an element between bromine and rubidium; and Professor Ramsay believes that xenon, as the last-mentioned new element has been named, will after purification fill the space satisfactorily. There yet remains a gap to be filled between iodine and cœsium, which should be a liquid. In conclusion, Professor Ramsay said the history of the discovery of these new gases possesses no commercial importance, being of purely scientific interest.

The Diesel Gas-Motor.

It appears from a recent account of the Diesel gas-motor, published in the "Engineer," that this is an interesting example of the realization by mechanical engineering of a theoretical suggestion. The two chief advantages claimed for the Diesel engine are economy of combustible, and small size for the power developed. It is of the four-cycle gas-engine type; but at present the motive power is derived from oil. The idea is to inject a minute quantity of oil into a comparatively large volume of highly compressed, and therefore highly heated, air; the combustion being slow. Work is done during and after combustion by the expansion of the gases of combustion. Spontaneous ignition of the charge is ensured by the high temperature of the compressed air; and such complete expansion of the charge is obtained that the waste gases are expelled at a comparatively low temperature. Thus it appears that the principle upon which Herr Diesel chiefly depends for the realization of his object is the production of the highest temperature of the cycle, not by combustion, but by the compression of the air. The Diesel motor, in fact, is a high-pressure engine in which the air alone is compressed, and not the combustible charge needed to form the expanding mixture, as in other oil and gas motors. It is in contemplation to work the engine either with powdered coal, lighting or power gas, or oil. But up to the present time oil only has been actually used; the experiments upon other fuels not being completed. When the engine was first made, difficulties were experienced in getting the valves tight enough for the very high pressures employed. These have been overcome. It is claimed that new German patterns of this motor have yielded a brake horse power for the consumption of 0·43 lb. of petroleum. At this year's Munich Exhibition, four Diesel engines were shown; and it is recorded that they ran very quietly, without noise, and with scarcely any odour. The consumption of oil varies very little per horse power, whatever the size of the engine or the load; and this is an important point in its favour.

The Presumed New Gas "Etherion."

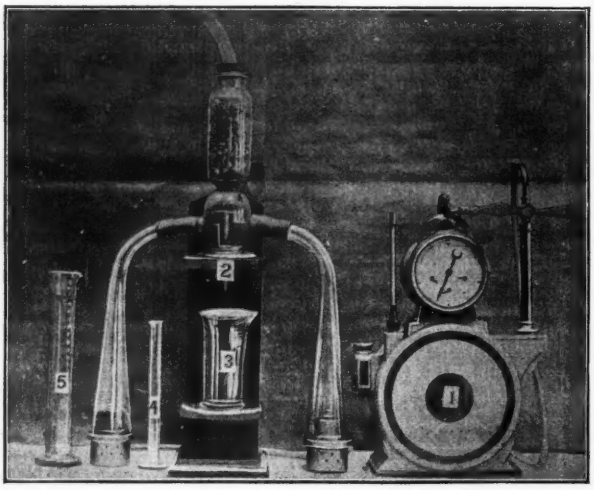
It has been notorious for some little time past that in the search for new atmospheric elements which, started by Lord Rayleigh and Professor Ramsay, has been followed up by chemists of all nations, America, in the person of Mr. Charles F. Brush, figures for the discovery of the new gas "Etherion." Doubts have been cast upon the existence of this reputed constituent of the atmosphere; but the fact of Mr. Brush having read a paper describing his new find before the Chemical Society of Cleveland, should silence cavillers. The author stated that at the very starting of his research he encountered difficulty in the absence of means of producing the very low pressures he needed; but to surmount these difficulties, he invented the best mechanism for this purpose yet used. When he came to examine air at very low pressures, and under certain conditions as to heat conductivity, Mr. Brush was brought to draw several lines on a diagram of pressures which no known gas would account for. Thus the existence of a new gas was indicated. Since etherion, as Mr. Brush names it, has no known chemical effect upon familiar elements, and will neither burn nor form combinations, it would probably have remained undiscovered if the usual chemical experiments only had been used in the research. It was detected by its exhibiting the characteristic of enormous heat conductivity at low pressures. Mr. Brush had noticed, in the course of a long series of high vacua experiments, that glass apparatus, when highly exhausted and heated, evolved gas for an indefinite length of time—rapidly at first, then slower, but never stopping until the temperature was reduced. Then rapid reabsorption took place, but was never complete. The latter process was therefore a selective one. Mr. Brush took to using pulverized glass for absorption purposes, and tested the evolved gas by its capacity for conducting heat. When a good vacuum was attained, something was found to be coming off which conducted heat twenty times as rapidly as hydrogen. Mr. Brush therefore believes that his new gas resides in, and not merely on, the surface of glass; and as the glass became "rejuvenated" in this respect by exposure to the air, he concludes that it is a constituent of the atmosphere. When he can get it pure, he expects it will show a power of conducting heat more than 42 times that of hydrogen, or 100 times that of air.

COMMUNICATED ARTICLES.

THE DOUBLE SULPHUR TEST FOR BISULPHIDE OF CARBON.

By S. Carpenter, of East Ham.

The writer is aware that, in connection with what he is about to say on the work of the double sulphur test, a question may be raised by some as to the need of such test. But it was always needed; and he ventures to think that if it had been adopted when he first introduced it nearly thirty years ago, the sulphur would have been brought more under the gas manager's control. By making two tests in 24 hours, if anything went wrong with the lime in the purifiers, it would be shown at once, whether it were in the daytime or at night, that the chemical action of the lime had been interfered with. In the early days of the writer's testing for bisulphide of carbon, he found the double sulphur test very useful when he took two and sometimes three tests in 24 hours, as he could burn 5 cubic feet of gas in each test, which is the lowest quantity that should be used in any one test, to be relied upon. At the inlet of the first lime purifier the gas should be tested for carbonic acid and bisulphide of carbon. This would show what quantity of these impurities the crude gas contained before it entered the vessel. It should also be tested at the middle and the outlet of the purifier for carbonic acid. At the outlets of the first and second purifiers it should be tested twice in 24 hours for bisulphide of carbon. Before the gas is tested at any place, it should be passed through a small purifier charged with oxide of iron. If the gas is tested twice in 24 hours with the double sulphur test at the different places mentioned, the sulphur in other forms than sulphuretted hydrogen will be well under control, and the condition of the lime in each purifier can be ascertained with sufficient accuracy for practical purposes; thereby enabling the engineer to so regulate his



purifiers as to obtain steady results. By preventing atmospheric air and furnace gases from passing into the lime purifiers, the hitherto unaccountable variations in the chemical action of the material on the crude gas will be obviated. After the testing for carbonic acid and bisulphide of carbon has been carried on for a short time, the manager will be able to ascertain the right method of using the double sulphur test, and working the lime purifiers on the writer's principle, with sufficient accuracy for practical purpose. By noticing the quantity of lime in each purifier and the amount of gas passing through, and at the same time observing the reduction of the sulphur, it will be seen how much gas can be purified from carbonic acid and a portion of the bisulphide of carbon by a certain bulk of lime. This will be a great help to the manager, by showing him whether or not the purifiers are charged at the proper time.

The writer's method of working lime purifiers is as follows: Have two boxes at work at the same time. Every morning have a record taken of the sulphur from the outlets of the first and second purifiers, the quantity of gas which has passed through, and the time when the purifier was charged. By this means the manager will know the condition of the lime. If such a system of employing lime purifiers is adopted, it will prove of great advantage. The primary object to be sought at the present time is to utilize and perfect the existing process of purification; and it can be made to yield satisfactory results. If the lime and oxide purifiers are worked by the writer's rotation system, the whole of the carbonic acid and two-thirds of the bisulphide of carbon can be taken out.*

The following is a description of the double sulphur test and the method of its manipulation: The large cylinder is furnished with two nozzles, to which are connected two trumpet-tubes, and two burners, each passing half a cubic foot of gas per hour. By this means the writer was able to make two tests in 24 hours, which kept him well informed as to the condition of the lime in the purifiers, and to satisfy himself as to whether or not anything had happened to interfere with the chemical action of the lime on the crude gas, which would cause the sulphur to be high. The rate of burning the gas during the test is officially fixed at half a cubic foot per hour; but the writer prefers to pass double this quantity, so that the services may be kept in a more active condition. With regard to the apparatus, which is shown in the accompanying illustration, 1 is the meter for measuring the gas to be burnt; 2, the sulphur test proper; 3, a graduated beaker to receive the condensation water from the cylinder; 4, a long glass tube measuring 1000 grains; and 5, a glass beaker measuring a pint up to the marks shown. The trumpet-tubes convey the products of combustion from the two burners to the large cylinder where they are condensed. Provision is made at the burners for either sesquicarbonate of ammonia or liquid ammonia to be used. Sometimes the carbonate is very hard, and then it does not give off sufficient ammonia for the test. At such a time, liquid ammonia would be very useful. The writer prefers this, and he has provided for each burner a tin cup, through the centre of which there is a small tube, so that the burner can pass through it. The space round the tube is filled with liquid ammonia, which can be manipulated much better than the carbonate; but the apparatus is so arranged that one can be substituted for the other. The trumpet-tubes also convey the atmospheric air. The combustion products unite with the oxygen of the air and produce water, which contains the sulphur.

The whole of the ammonia and carbonic acid, and as much of the bisulphide of carbon as possible, should be removed from the gas. If an excess of ammonia or bisulphide of carbon is left, it is very destructive to fabrics. The beaker should be graduated into grains, as well as tenths and hundredths of grains, so as to measure accurately the number of grains of water condensed from the gas burnt in the test. If the temperature of the air in the room where the sulphur test is at work is about 60° Fahr., each cubic foot of gas burnt will produce from 380 to 420 grains of water. Measuring the water produced will show whether the gas which has passed through the meter has been properly burnt. There is a possibility of the gas escaping at the horizontal piece of tube which screws into the base of the burner. If this should occur, it would be registered and not burnt, and the sulphur would be low, because the gas had not been consumed, and the water would be of a dark colour, and there would be less condensation. The number of grains of water per cubic foot of gas will vary according to the temperature of the air where the test is at work. Where 10 cubic feet of gas have been burnt, the condensation water should measure from 3800 to 4200 grains. When the test is working properly, if the burners at any time show a luminous flame, it will be necessary to remove the top piece of the burner, and having gently hammered down the nozzle of soft metal, perforate it afresh, making as small a hole as will give passage to half a cubic foot of gas per hour.

When setting the test to work, ascertain that the india-rubber tube fits tightly on the trumpet-tubes, and also on the nozzles of the sulphur cylinder; and see also that the tube from the outlet of the meter to the burners is gas-tight. The meter will shut off the gas when 10 cubic feet have passed through. Then read off the number of grains of condensation water in the beaker. The cylinder and trumpet-tubes are to be washed out with distilled water at the end of each test. The liquor in the beaker and the water used in washing out the cylinder and the trumpet-tubes should be put into No. 5 beaker, and be well mixed and made up to one pint by the addition of a quantity of distilled water.

The following is the method of working off the results of the writer's cold sulphur test: Take 1000 grains of the solution obtained from the test, put it into a beaker, and treat it with sufficient hydrochloric acid to leave an excess of acid in the solution. By this means any carbonates there are in the liquid are decomposed. Next add an excess of a solution of barium chloride. The liquid should be allowed to stand until the thick white precipitate settles at the bottom of the beaker. The clear portion is then poured off, and passed through a paper filter. The sediment at the bottom of the beaker should be washed with distilled water by means of the wash-bottle, and filtered in the same way. The filter is then left to dry, after which it is transferred to a weighed platinum crucible, and heated over a bunsen burner to a bright red heat. When no black particles remain in the crucible, turn off the gas, and allow it to cool. The crucible and its contents are then re-weighed, and the increase in weight gives the number of grains of barium sulphate resulting from the test. Observe the quantity of gas consumed; then on referring to the table in the pamphlet already mentioned the number of grains of sulphur in 100 cubic feet of gas will be ascertained.

After long experience in testing according to the foregoing method, the writer has neglected corrections for temperature and atmospheric pressure. The difference in the results of the sulphur test caused by variations of the thermometer and barometer was so small that the correction was discarded to save time, which to him was valuable. With the thermometer at 60° Fahr. and the barometer at 30 inches (the standard temperature and pressure), there is, of course, no correction necessary; but if the thermometer falls to 52° and the barometer to 28·1 inches, the tabular number is 0·955. The result

* For a short description of the method of working the sulphur test and a table for calculating the results, see the author's pamphlet on "The Purification of Coal Gas."

of the test being 12 grains, this would, by correction, be increased to 12·5 grains—a difference of half a grain. On the other hand, supposing the barometer remains at 30 inches, and the thermometer falls to 46°, the tabular number is 1·035. The quantity of sulphur is 12 grains as before; but this would, by correction, be decreased half a grain, making it 11·5 grains. The writer ventures to think that any practical gas manager will agree with what he is about to say in regard to the variations of the barometer and thermometer. Supposing there is half a grain of sulphur added to, or a like quantity deducted from, the 12 grains found in the gas tested, this quantity of sulphur in 100 cubic feet of gas is so small that it is not worth noticing or wasting valuable time upon.

As a comparison between the method of testing described above and the boiling process prescribed by the Gas Referees, the writer has made a series of tests by both systems; and the following figures show the closeness with which the results approximate:—

Boiling Process.	Carpenter's Method (Cold Process).
13·5 grains of sulphur.	13·9 grains of sulphur.
13·7 " "	13·2 " "
13·2 " "	13·2 " "
14·4 " "	14·9 " "

It will be seen that the average of the latter method is slightly higher than that of the former; showing that the cold process tends to extract the sulphur to the utmost extent, which it will be admitted is a merit.

The question may arise as to what advantage is gained by using the double sulphur test. In the first place, two reliable tests can be taken in 24 hours; 10 cubic feet of gas being burnt in ten hours. The writer does not put much confidence in the test when only 2 or 3 cubic feet of gas have been burnt. By using the double test, 5 cubic feet of gas can be burnt in five hours, which is the lowest quantity that ought to be used to get a reliable test. Secondly, by making two tests in 24 hours, the manager will be kept well informed as to the condition of the lime in his purifiers.

The gas should be tested at the inlet as well as the outlet of the scrubbers for ammonia, carbonic acid, and sulphuretted hydrogen; and that coming from the outlet of the scrubber should be passed through a purifier charged with hydrate of lime. Two lime purifiers, 28 feet square and from 5 to 6 feet deep, having four trays of grids in each, with about 12 or 13 yards of slaked lime on each tray, will be large enough to take a make of from 20,000 to 60,000 cubic feet of gas per hour. The lime in the first purifier will decarbonate the gas, and take out a portion of the bisulphide of carbon. The decarbonated gas should be passed into the second lime purifier (of similar size, and charged with lime in precisely the same way as the first), by which another portion of the bisulphide of carbon will be removed. These two purifiers will be sufficient for the purification of the gas from all the carbonic acid and two-thirds of the bisulphide of carbon. The gas should be tested at the inlet and outlet of the first purifier for carbonic acid, and at the outlet of the second purifier for bisulphide of carbon. Testing the gas at the lime purifiers will show when they are to be changed. When the carbonic acid or the sulphur is as high at the outlet as it is at the inlet, the first purifier should be shut off, and the second one made the first. A clean purifier should then be put on for the second one. If the purifiers are worked in this way, the sulphur will be kept right. The gas from the outlet of the lime purifiers should be passed through a series of oxide of iron purifiers, to eliminate the remaining sulphuretted hydrogen. In order to make sure of the gas being perfectly clean, a test should be applied at the middle and at the outlet of each oxide purifier; and these should continuously burn a cubic foot of gas per hour. The gas should be tested for sulphuretted hydrogen and bisulphide of carbon at the outlets of the station meter and gasholder. If atmospheric air and furnace gases are not permitted to pass into the lime purifiers, and the gas is tested at the places mentioned, no trouble will arise in purifying the gas, and it will be as pure as it can be made at the present time.

A few words may now be addressed to managers who are about to use lime for the first time for purification. They should proceed in the following manner: The gas from the outlet of the scrubbers should be passed direct into the lime purifiers, of which there should be two. After the first purifier (the function of which is to decarbonate the gas) has been in action for 24 hours, the gas should be tested for bisulphide of carbon. The first test will not be very low; clean lime having but little affinity for bisulphide of carbon. When the lime has become sufficiently sulphided, the second test will be much lower. Then set the second purifier to work; and it will take out the bulk of the sulphur. When the two purifiers are in action, and the lime is sufficiently sulphided in the second, the sulphur should be about 12 grains in 100 cubic feet of gas. The gas should be tested twice a day at the lime purifiers. If the writer's plan is followed, and the purifiers are worked in the manner he has described, the double sulphur test being used, the sulphur will never be high. Lime is never anything else than lime; and in itself it does not go wrong. It is something that approaches the lime in the purifier—something that is not coal gas—which interferes with the chemical action of the material. It may be that there is an excess of air or furnace gas, or the lime may have been too wet when put into the purifiers. Either of these would interfere with the action of the lime.

A system of simple testing may be advantageously employed, by which the condition of the lime in the purifiers can be adequately ascertained. In the first place, it is advisable to frequently test the gas for carbonic acid in the middle of the first lime purifier, for carbonic acid and bisulphide of carbon at the outlet, and for bisulphide of carbon at the outlet of the second purifier. For detecting the carbonic acid, the writer employed an apparatus made with a two-necked bottle. Having filled the bottle half full of lime water, he first passed the gas through a small purifier charged with oxide of iron, and then through the lime water. The gas should bubble through it for about three minutes. If the water remains transparent, the gas is free from carbonic acid. Those who follow the writer's advice, and take out all the carbonic acid by the first lime purifier, employ a second one for removing the bisulphide of carbon, and keep atmospheric air and furnace gases from passing into the lime purifiers, will have achieved a great object in the purification of coal gas; while, by using the double sulphur test, considerable advantage will be gained in testing for sulphur other than sulphuretted hydrogen.

In conclusion, the writer has only to add that, as the result of his practical experience of the working of the double sulphur test for twelve years, he can confidently say that he found it to correspond with the single sulphur test.

SLOT COOKERS AND ALL ABOUT THEM.

By E. W. T. Richmond.

Second Article.

"We may boldly spend upon the hope of
What is to come in."
"Henry IV.," Part I., Act iv., Sc. 1.

1895. Colonel Makins, The Gaslight and Coke Company's Meeting.

The year 1895 opens auspiciously with the first official utterances by the Governor of The Gaslight and Coke Company (Colonel W. T. Makins), at the 166th half-yearly meeting, held on the 8th of February. He refers to 1500 meters fixed with 800 stoves, and congratulates the South Metropolitan Gas Company on their wonderful success, but fears no such record will be theirs, although he anticipates an eminently satisfactory business. The remarkable figures just published of The Gaslight and Coke Company show, however, that, wherever the public can be supplied with all they want to properly use gas both for lighting and cooking upon inclusive terms, even at a good round price, they will take it. They object to rentals and deposits, but willingly pay for all supplied in the price of the gas. The Colonel might well say with King Henry V.:

"What are thy rents?
What are thy comings in?"

The marvellous field lying fallow among the working and lower middle classes may be judged by the fact that the 800 users of cookers referred to by Colonel Makins, supplied free with the automatic meters, has grown, as it were by the wave of a magician's wand, to over 70,000 in less than four years—an increased revenue from these cookers alone of £100,000 per annum (about 25s. each cooker annually), as, with an average consumption of 8000 cubic feet per annum, an annual *day consumption* of 560 million cubic feet is obtained, or as large a consumption as the *total make* in towns of the size of Bury St. Edmunds, Chorley, Dumbarton, Gainsborough, Haslingden, Kendal, Llandudno, Malvern, Warwick, and Waterford. The importance of this, our new oil competitor, is further emphasized by the promotion of the automatic meters and stoves to the first topic of Mr. George Livesey's speech to the South Metropolitan Gas Company's shareholders five days later.

Mr. G. Livesey, South Metropolitan Company's Meeting.

Mr. Livesey shows how in eighty years they had obtained 80,000 ordinary consumers, but that in two years the automatic consumers reached 20,000. He again takes the high ground of the desirability of gas companies consulting the needs of their customers, and congratulates all those companies who have adopted the system. In Worcester's words:

"It lends a lustre, and more great opinion, a larger dare
to our great enterprise"

Mr. F. G. Dexter, Winchester.

We now come to the address of Mr. F. G. Dexter, of Winchester, from the presidential chair of the South-Western Association, on the 30th of April, 1895. As might be expected from one of the apostles of incandescent street lighting, he treats the matter with a freedom which is refreshing in its candour, condemns the addition of an endless tax on the automatic consumer of 9d. or more per 1000 cubic feet, and advocates the opening of a "suspense account" against each consumer, and after the extra charge has wiped out the original outlay (based on cost of materials, labour free), he increases their supply to the same rate as that of the ordinary consumers. This system is one that

HOUSES SUPPLIED WITH SLOT COOKERS BY THE BRENTFORD GAS COMPANY.

NUMBER OF SLOT COOKERS FIXED BY THE COMPANY, 12,600.

BETTER-CLASS HOUSES, BERRYMEAD GARDENS, ACTON, W.

Rentals of "slot" houses vary from 3s. per week to £35 per annum.
Number of cubic feet of gas for 1d. 22½
Extra charge per 1000 cubic feet to prepayment consumers . 8d.

CHEAPER-CLASS HOUSES, BECKLOW ROAD, SHEPHERD'S BUSH, W.

Rentals of "slot" houses vary from 3s. per week to £35 per annum.

calls for thoughtful treatment; and more will, I believe, be heard of it. It means, of course, a good deal of extra book-keeping—in Mr. Dexter's case about half the time of a junior clerk at an expense of less than 10s. per week. But the advantage on the side of really equitable dealing is manifest, and, moreover, is greatly appreciated by the Winchester consumers. He fixes cookers, too, of the best type, believing—and correctly so—that they will wear longer, and give better cooking results. Five per cent. interest on the cost of these is permanently added to the gas rental. I would respectfully recommend engineers to obtain from Mr. Dexter full details of this novel and admirable system.

Colonel Makins, in August, 1895, again draws attention to the advantages of the automatic meter cookers in the following happy statement: "He had heard that bakers in the East-end of London were complaining of a falling off in their business.

EAST-END BAKERS.

They had been in the habit of cooking the artizans' dinners; but now, since the working classes had got the automatic meters and gas-ovens, they had commenced to cook their own dinners. That was a straw showing the direction in which the wind was blowing; and he was glad to see it was blowing in the right direction."

MR. H. C. WARD.

On the same day, Mr. Howard Charles Ward, the Chairman of the Brentford Gas Company, alludes to "the increase in their district from 800 automatic stoves to 2740." This Company were then charging an annual rental of 2s. 6d., which I am glad to note has been since abandoned; and the Company's Engineer, Mr. J. Husband,

HOUSES SUPPLIED WITH SLOT COOKERS BY THE WINCHESTER GAS COMPANY.

NUMBER OF SLOT COOKERS FIXED BY THE COMPANY, 350.

BETTER-CLASS HOUSES, ST. PAUL'S TERRACE, WINCHESTER.

Rentals per week . . . . . 10s. 6d.
Number of cubic feet of gas for 1d. 22

CHEAPER-CLASS HOUSES, ST. JOHN'S BACK ROAD, WINCHESTER.

Rentals per week . . . . . 6s.

MR. J. HUSBAND, AT BRENTFORD.

is well satisfied that this abolition of the rental is responsible for the large increase during the last twelve months in their slot cookers. To quote the words used by Colonel Makins, this is another "straw showing the direction in which the wind was blowing." May it increase to half a gale, carrying rentals clean away, greatly advantaging the *day consumption* of all gas departments.

"BIRMINGHAM DAILY GAZETTE."

A propos of this, the "Birmingham Daily Gazette," in September, 1895, stated, on the authority of a South Yorkshire Colliery Company, that the then existing depression in the coal trade was chiefly attributed to the use of gas cooking-stoves in the London districts.

The next important contribution to the question—now fully recognized as a "burning" one—is the meeting of the North of England Association, held at Hexham in October, 1895. It

MR. H. LEES, HEXHAM.

finds a friend in the President, Mr. Herbert Lees, who refers to the fixing of a griller or a small cooker as an advertising medium for gas cooking. I have Mr. Lees' permission to state that he finds the cooker pays better than the griller, allowing for the extra outlay, and that it gives greater satisfaction.

MR. J. HOLLIDAY, SCARBOROUGH.

There then follows an admirable paper, full of useful statistics, by Mr. J. Holliday, of Scarborough, bearing signs of the careful compilation we have learnt to expect from one so well trained as Mr. Holliday has been. "The Encouragement of Small Consumers" in Scarborough has only reached at present the supply of a griller with an automatic meter. Doubtless the small consumption—about 8000 cubic feet per annum—will be greatly increased when Mr. Holliday introduces "cookers free," which they have now, Mr. Holliday writes me under date Oct. 24, decided to do.

A very interesting discussion followed, in which Mr. H. Tobey (Malton), Mr. E. H. Millard (Durham), Mr. J. Whyte (Seaham

HOUSES SUPPLIED WITH SLOT COOKERS BY THE TUNBRIDGE WELLS GAS COMPANY.

NUMBER OF SLOT COOKERS FIXED BY THE COMPANY, 1226.

BETTER-CLASS HOUSES, ST. JAMES'S PARK, TUNBRIDGE WELLS.

Rentals per week	11s.
Number of cubic feet for 1d.	21
Extra charge per 1000 cubic feet to prepayment consumers	11½d.

CHEAPER-CLASS HOUSES, BERKSHIRE COTTAGES, CAMDEN ROAD, TUNBRIDGE WELLS.

Rentals per week	5s. 6d.

Harbour), Mr. Hall (Pelton Fell), Mr. T. Bower (West Hartlepool), Mr. J. H. Penney (South Shields), Mr. W. Ford (Stockton-on-Tees), Mr. Coates (Ottawa), and the President took part. With the exception of Mr. H. Lees, who took occasion to state that without the griller the automatic consumption did not pay, and that where cookers had been fixed they paid well, we find grillers are at this date chiefly the aids to the day consumption of gas in the North Country.

MR. J. YOUNG, HANLEY AND NORWICH.

The last contribution for this year, but by no means the least important, is the address by Mr. J. Young (then of Hanley, now promoted to Norwich) on "Two Years' Experience of Prepayment Meters." In common with many engineers at this time, Mr. Young had not made up his mind to supply either gas fittings or stoves, being in doubt as to the need of it, and, further, as to the fairness of charging the same price to those who had fittings already as to new consumers who had to be fitted up complete. (Possibly Mr. Dexter's method might have solved the problem.) As one might have expected, however, Mr. Young's commercial instincts have triumphed; and at Norwich he has come over to the majority, and now fits up houses complete, including three lights and a cooking-stove. The placard underneath the 5-feet burner in the British Gas Company's window at Hanley was a happy idea; and exposing the meter's mechanism was a specially good notion, and has recently been followed in the Plymouth Gas Company's showroom. Nothing draws a crowd like a moving figure in a window; and, after all, publicity is what is needed in gas as well as in other commercial businesses. The writer was struck with Mr. Young's statement that the average of 8818 cubic feet supplied through the prepayment meter was a little in excess of that of their ordinary meter consumers.

In the subsequent discussion, excellent speeches were made by Mr. F. W. Cross (then of Wellington, now of Lea Bridge)

HOUSES SUPPLIED WITH SLOT COOKERS BY THE NEWMARKET GAS COMPANY.

NUMBER OF SLOT COOKERS FIXED BY THE COMPANY, 150.

BETTER-CLASS HOUSES, SUSSEX COTTAGES, NEWMARKET.

Rentals per week	8s.
Number of cubic feet of gas for 1d.	20
Extra charge per 1000 cubic feet to prepayment consumers	6d.

CHEAPER-CLASS HOUSES, BLACK BEAR LANE, NEWMARKET.

Rentals per week	2s.

and Mr. W. North (Stourbridge). Mr. Cross urged the adoption of shilling-in-the-slot meters, which I may note, in passing, were first placed on the market in any quantity during the spring of this year, although recommended in 1888—seven years previously—by Mr. Price, of Hampton Court, at the Southern District Association Meeting. Mr. C. Meiklejohn (Rugby) and Mr. North condemned the shilling-in-the-slot meter as being beyond the means of consumers catered for by the penny meters. Mr. North described the excellent results following his liberal treatment (compared with Mr. Young's) of his consumers as regards gas-fittings; and since then he has added to the benefits cookers at low rentals.

MESSRS. CROSS, MEIKLEJOHN, AND NORTH.

1896.

The year 1896 takes us into the heart of the movement as far as the Metropolis is concerned; and we feel the pulsations extending all over the country. Those gas companies and corporations who do not of themselves move are requested to do so by numbers of their would-be consumers; and the inquiries and orders roll

into the meter makers faster than they can be dealt with—the deliveries to The Gaslight and Coke Company alone at one part of this year being 16,000 meters in arrear. The law of supply and demand, however, soon regulates matters; and now orders can be executed from stock. Strange to remark, however, the deliveries of stoves were never far behind, and frequently we find stoves delivered waiting for meters.

METER DELIVERIES BEHIND.

At this time, five undertakings—The Gaslight and Coke, South Metropolitan (whose figures have already been recorded), Brentford, Liverpool, and Ipswich Companies—have orders now totalling, after an average of less than three years' working, to upwards of 150,000, about 60,000 of these having cookers fixed; but the proportion of just over one cooker to three meters will now be found to have increased considerably, averaging about two cookers to three meters.

BIRMINGHAM DAILY POST.

Early in January, an interesting article appeared again in a Birmingham daily paper—this time the "Birmingham Daily Post." The writer sketches the history of small consumers from 1877—showing that they never paid until the adoption of the automatic meter, along with a boiling-burner; and he suggests the desirability of adopting a small cooker. When the public Press advocates such a course, it is not long before some active steps are usually taken in the desired direction.

MR. G. LIVESEY CHARGES METERS AND STOVES TO CAPITAL.

At the South Metropolitan Gas Company's half-yearly general meeting, held in February, Mr. George Livesey gave some valuable information as to the financing of the new system. "Meters and stoves," being removable, were charged to "*capital*." "Gas fittings and piping," and other materials, were charged to a "*suspense account*," to be liquidated by the extra charge made for gas supplied on the automatic system. The labour used in fitting up was charged to "*revenue*." At this time, their 43,000 coin consumers had only £31,000 debited against them in the suspense account—a very satisfactory showing.

MR. I. CARR, WIDNES.

Lancashire now makes its voice heard, and this time through the well-known personality of Mr. Isaac Carr, who, in his Presidential Address to the Manchester District Institution, in March, described the results of the coin-freed meter in Widnes. True to his well-earned character as a purveyor of the cheapest coal gas in the world, he supplied 30 feet for a penny (since increased to 36 feet), and he still reserves an extra 1s. per 1000 cubic feet for interest and sinking fund on fittings supplied. I am very glad indeed to note that, though commencing with the usual boiling-ring, Mr. Carr now fixes cookers at a small rental.

MR. W. R. CHESTER, NOTTINGHAM.

No presidential pronouncement would now be complete without a reference to this system; and we find that Mr. W. R. Chester, in his address to The Gas Institute in June, refers to the satisfactory result attending its introduction into Nottingham without "artificial inducements." From Mr. Chester's remarks in the discussion on the paper by Mr. A. Dougall, of Tunbridge Wells, on "Popularization of Gas," read the following day, it is evident that this meant the supply of fittings and cookers. The "artificiality" of supplying a growing demand on a paying basis is, however, scarcely apparent. Mr. Chester is not usually slow to appreciate a good thing, and the excellent results obtained wherever inducements, *natural and not artificial*, have been given, will doubtless convert him. Certainly the paper by Mr. Dougall just referred to should lead to good results. There is quite difficulty enough attending the introduction of new methods among many gas companies and corporations without the leaders of the gas industry holding back. The introduction of the prepayment meter into Nottingham attracted the attention of a Mr. Simpson, a mechanical engineer, who was then engaged in perfecting sewing machines, typewriters, &c. He devoted his energies to improving the irregularities of the then existing patterns of meters, with the result that his meter has established a reputation for simplicity and accuracy second to none. Messrs. Willey and Co. took up the patent, and, as a natural sequence, Mr. Simpson removed from Nottingham to Exeter, and is now engaged in superintending its manufacture there.

MR. SIMPSON, NOTTINGHAM TO EXETER.

MR. A. DOUGALL, TUNBRIDGE WELLS.

The writer has referred to the Tunbridge Wells Gas Company as a provincial pioneer of "gas cookers fixed with slot meters." Mr. Dougall's "Popularization of Gas" paper contains a comparative table giving the consumption of 225 houses, fixed complete with cookers ranging between 3000 and 64,000 cubic feet per annum, and 541 without cookers with consumptions from 1000 to 25,000 cubic feet per annum, is most instructive. *The average works out to 14,409 cubic feet per annum with cookers, and 6773 cubic feet per annum without.* The paper is worthy of a place as a standard of reference among the commercial statistics of gas distribution. The author points out that instruction should be given in gas cooking with these stoves, as, after a failure, the inexperienced housewives may go back to the old fire-grate; but when they once properly use a gas cooker they never give it up. His suggestion that cooks, when married and settled down, instead of going out to char might give homely demonstrations in slot districts, under the gas company's auspices, is worthy of adoption. Mr. Dougall evidently agrees that—

> "A woman sometimes scorns what best contents her;
> Send her another, never give her o'er."

The interest displayed in the discussion, which covered also an admirable paper by Mr. Norton H. Humphrys, of Salisbury, on "The Hiring-Out of Gas Apparatus"—a subject just outside the limits of these articles—was remarkable; proving beyond doubt the immense strides made by the system since 1891. Those present will remember the following gentlemen who took part in the discussion: Mr. G. Anderson (London), Mr. H. Lees (Hexham), Mr. W. A. Valon (Ramsgate), Mr. I. Carr (Widnes), Mr. W. D. Child (Romford), Mr. T. N. Ritson (Kendal), Mr. Alderman Miles (Bolton), Mr. R. Porter (Elland), Mr. J. Andrews (Langley Mill), Mr. W. Carr (Stalybridge), Mr. R. G. Shadbolt (Grantham), Mr. A. Graham (Mansfield), and the President (Mr. W. R. Chester).

These gentlemen, representing districts North, South, East, and West, gave their experience of the system; and several recommended the supply of cookers, including Mr. Lees, who fixed old pattern ordinary cookers free, to the satisfaction of all concerned. Mr. Isaac Carr, remarked that "any engineer who felt his business required a fillip could obtain it by the introduction of the system of hiring-out stoves with penny-in-the-slot meters;" Mr. Alderman Miles "was quite sure a great field even yet existed for cooking-stoves with slot meters;" and Mr. Andrews "agreed that it would be to their advantage to adopt gas cookers with coin meters, as far as they possibly could." Thus finished a discussion showing a practically unanimous approval of the system, assisted by the use of cookers, by representative speakers, which cannot fail to move those who "listen but speak not."

MR. ISAAC CARR, ALDERMAN MILES, AND MR. ANDREWS.

Shortly after the Institute meeting, there appeared the annual report, covering the twelve months ending March 31, 1896, of the Manchester Corporation Gas and Electricity Department—prepared with Mr. Charles Nickson's usual care—containing an important paragraph detailing the fact that the supply of brackets and boiling-rings was much appreciated, and that the 3383 consumers used 22,700,000 cubic feet of gas in the year—an increase of 2402 users in that period. It is worthy of note that had cookers also been fixed, an additional consumption (based upon London experience of 8000 cubic feet for cookers) of 27,000,000 cubic feet, or practically double might have been obtained by increasing the outlay from, say, 30s. to 40s.

MR. C. NICKSON, MANCHESTER.

After this clarion call, surely Manchester must march into line with Bath, Brentford, Bournemouth, Coventry, Dover, Eastbourne, Hereford, Huddersfield, Hull, Ipswich, Leeds, Leicester, London, Norwich, Plymouth, and many other large towns, not to mention scores of medium-sized and smaller ones, such as Aldershot, Barry, Caterham, Dartford, Dorking, Falmouth, Grantham, Irthlingborough, Kidderminster, Littlehampton, Maidstone, Matlock, Newmarket, Romford, Stafford, Swindon, Tonbridge, Tunbridge Wells, Uxbridge, Wellingborough, Widnes, and Yeovil, &c. A few of these towns still charge a small rental for slot cookers; but every year sees the number reduced. Take, for instance, Lille, with 300,000 of a population in its lighting area, and only 14,725 consumers, or one to 49 of its inhabitants (Dublin, our smallest average, has one consumer to 21 inhabitants), had *increased its consumers 22 per cent. in one month;* and the Engineer, M. Melon, hopes to double his consumers by the year 1900—thus reaching to one consumer for every ten inhabitants, which is Bristol's average. It is worthy of note that M. Melon has 2894 cooking-stoves fixed with prepayment meters.

SOME LARGE TOWNS FIXING SLOT COOKERS.

SMALLER TOWNS.

LILLE AND M. MELON.

MR. CORBET WOODALL.

Returning again to the Metropolitan Gas Companies, the shareholders of the Tottenham and Edmonton Company were informed in August, 1896, by their gifted Chairman, Mr. Corbet Woodall, that in fifty years they had secured 5764 ordinary consumers, but that three years of the automatic meters had brought 3380 extra customers. "This result, in conjunction with the remarkable increase of gas used for heating and cooking, made the future of the Company bright and promising."

MR. C. H. NETTLETON, DERBY (CONN.).

Mr. Charles H. Nettleton, of Derby (Conn.), in a paper read in November, 1896, to the American Gaslight Association, referred to the success attending the supply of stoves and fittings free by the South Metropolitan and other English gas companies, and stated that he found, after careful inquiry, that an average cooking-stove consumption (by an ordinary consumer) with dollar gas ($1 per 1000 cubic feet) varied from 15,000 to 20,000 cubic feet a year; while the lowest return with gas at a considerably higher price was 8000 cubic feet. This information agrees with our own experience as regards the lowest (8000 cubic feet), and this by small 12-inch oven cookers with only two boiling-burners. But we can show more than a 20,000 cubic feet average on ordinary cookers with cheap gas. Although the system is not as yet generally adopted in America, we find it now going through the stages there that the year 1894 witnessed in England. Williamsburg is one of the pioneer towns, with an average consumption of 1700 cubic

feet per month, or 89 per cent. more than their average 3-light meter consumption.

One of the last public references to the prepayment system in 1896 was Mr. J. H. Penney's, of South Shields, in his address from the chair of the North of England Association. He thus sums up its advantages: "It bids fair to be one of the greatest conveniences of modern times."

MR. J. H. PENNEY, SOUTH SHIELDS.

The selection of any special towns now becomes very difficult, as the reports referring to the system coming from gas companies and corporations are full of interest. I cannot, however, omit the mention of Stourbridge—a typical moderate-sized gas-works (with cheap coal competing), making just over 100 millions with 2500 consumers, and a population of about 9500. In 1896, the Gas Department, under enterprising management, had 1300 slot meters out; and the number has since been increased to 2200—500 with slot cookers at small rentals.

STOURBRIDGE.

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The views interspersed throughout this week's article, with accompanying foot-notes, detail various interesting facts as to the progress made by Provincial Companies and Corporations, several of which are not otherwise referred to in the text.

So ends the year 1896, in which was seen an unmistakable desire on the part of the public to have cookers with their meters; and the conviction has gradually grown up among Gas Departments that the desire should be encouraged. In it also shilling-in-the-slot meters came to the front; and it seems probable that their use for gas fires and cookers may become general with ordinary consumers of gas, who desire, equally with the suppliers, to prevent the waste so often resulting from an unchecked consumption.

> "And since this business so air is done,
> Let us not leave till all our own be won."
> "Henry IV.," Part I., Act v., Sc. 5.

(*To be continued.*)

TECHNICAL RECORD.

AMERICAN GAS LIGHT ASSOCIATION.

Twenty-Sixth Annual Meeting at Niagara Falls, N.Y.

This meeting was held on the 19th, 20th, and 21st ult., under the guidance of the President, Mr. J. B. Crockett, of San Francisco. The list of applicants for membership was unusually large, including no less than 53 active and 14 associate members. The resignations, &c., were only 12, so by the acceptance of these proposals, the Association shows a net increase of 55 names on the members' roll.

The report of the Council recognized the special exertions of Mr. Walton Clark in carrying on the work of the Committee on Education, and recommended the appointment of a Board of Trustees, to administer the funds and have full charge of the educational work. The Board is to consist of three members appointed by the Association and of the President and Ex-President *ex officio;* and Messrs. Walton Clark, E. Vanderpool, and W. F. Donthirt were recommended for appointment. The report of a Special Committee of the Council appointed to devise means for continuing the educational work of the Association, formed an appendix. It recommended the Board of Trustees above mentioned, who should be authorized to engage a competent Secretary to act as instructor. The expenses were to be met by voluntary contributions, from companies and others, to extend over five years, the total to be not less than £600 per annum. A circular and subscription form had been issued, and had already brought in promises equal to £640 per annum; and it was recommended that this list should be kept open, as any balance in excess of present requirements could be invested as a permanent fund for the benefit of the trust. The Secretary's salary would be £600 per annum, and the incidental expenses about £50; and they recommended a grant from the funds of the Association to meet the latter item. They were open to receive donations from those who did not feel at liberty to undertake a five years guarantee, which could either be invested and the interest alone used, or expended at the rate of not more than one-fifth in any one year. The report went on to suggest that the present Secretary of the Association be elected Secretary to the Trust, and stated that he was prepared to work the two positions together. The report of the Education Committee set forth that the class at present consisted of 77 members; and the Chairman, Mr. A. C. Humphreys, made a detailed statement as to the raising and administration of the fund, which was received with repeated applause. The Research Committee presented a report, in which they mentioned several matters as suitable subjects for papers to be submitted at the next meeting, and stated that a table of house piping had been prepared and issued to the members, as directed at the last meeting. They also recommended that the standards for gas-works castings, as suggested by the Society of Gas Lighting, should be adopted by the Association.

The President, in his inaugural address, remarked that most of his experience had been gained on the Pacific Coast, under conditions very different from those which prevailed in the neighbourhood where they were then assembled, and where materials and factories for the supply of plant were close at hand. He believed that the time was near when all the gas interests throughout the country would have to combine and make common cause against the growing impression that all so-called public utilities should be acquired and worked by the municipalities, which was advocated by writers on political economy, and had received prominent attention at the convention of mayors from various cities, which was recently held at Detroit. Even there a question was raised, however, as to the accuracy of the reports on municipal enterprise. The need for a uniform arrangement of accounts was insisted on; and it was also remarked that in common fairness the companies should be allowed to send their best representatives to argue their side of the question. After referring to Detroit and Philadelphia as examples of unsuccessful municipal enterprise, the President went on to argue that, fairly compared on an equal basis, the cost of municipal production and delivery would be found greater than those of companies. The municipal gas-works could be made into a vast political machine; but that did not tend to secure profitable or economical management. Great Britain had been frequently cited as an example in support of municipal ownership; but he had not met with any proof that, comparing towns of similar size and circumstances, the municipality could supply better or cheaper gas than a company. The question of long distance transmission of electricity generated by water power was next discussed at length, in the light of actual practical experience; and the conclusion was that long line transmission, as at present conducted, would not hurt the gas business. A passing reference to the competition of electricity led up to a consideration of the various methods available for encouraging the sales of gas. The plan of letting out stoves free at a guaranteed consumption per month was highly recommended. The necessity for some combined action on the part of the gas interests, to watch, and if necessary oppose, the action of legislators as affecting the industry, was strongly insisted on. Electrolysis of mains and services was the next topic; the experiences in this direction at San Francisco and at Spokane being particularly instanced. Mr. W. H. Preece, speaking on the subject in London, had stated that the whole of London was disturbed by the leakage of electricity from the City and South London Electric Railway; but that in no single instance was the disturbance such as could not be remedied by simple and ordinary precautions. The proposals of the Educational Committee were fully considered, and strongly recommended as deserving energetic support. In concluding, the President said the future of the gas industry looked exceedingly bright.

Mr. H. L. Doherty, of Madison, (Wis.), read a paper entitled "How can we Make the Use of Gas More Universal." He thought that the reasons why the use of gas-stoves during the summer months was not more general, were a want of appreciation of the real merits of this system of cooking, exaggerated ideas as to cost, procrastination, cost of installation, the use of bad gas-stoves, fear of a gas-stove and dislike to abandoning a satisfactory coal or oil range, the want of an economical and efficient means of heating circulating hot water systems by gas, and the difficulty of disposing of garbage. The reasons why they were not used throughout the whole year were a failure to perceive advantage in the use of gas except in hot weather, no provision for heating the kitchen other than the cooking stove, and the economy of solid fuels when heat was also required. He was strongly in favour of advertising, soliciting, and demonstrating the advantages of gas-stoves; and also carefully inquiring into all cases of complaint as to high bills. The two-meter system was very useful, as assisting in locating the actual consumption. Excessive draught on the oven burners was a cause of extravagance, and a patent arrangement for reducing or checking draught was described. Insufficient pressure was the cause of waste of gas, though this might seem anomalous. Half a gallon of water heated over burners consuming 4 and 12 cubic feet per hour respectively would be brought to boiling point, not only in less time, but also with less gas, by the larger, than by the smaller burner. Giving away stoves, or selling them greatly below cost, was a short-sighted and unbusinesslike policy. It led to undesirable ideas as to the Company's margin of profits, and was not appreciated, nor did the free stove meet with much care or patience in using. Once get the public well acquainted with the merits of the stove, and the cost would not stand in the way of its adoption. The use of a main stopcock on the supply-pipe was objectionable, as likely to lead to accidents, as also was the plan of arranging for the door to fly open in the event of an explosion. If a safety vent was desirable, it should be at the side or back. The hot water question was not yet nearly solved. Many of the high-pressure heaters on the market were crude, clumsy, and ineffective; and gas companies would do well to test these appliances both for efficiency and for consumption of gas. They should put at least 75 per cent. of the theoretical heating value of the gas into the water; but many of them did not yield 35 per cent., and the rate of consumption had a marked effect on the efficiency. The solution of this problem was exactly in the line of steam boiler practice. Instantaneous heaters were more efficient; but they were costly, troublesome, complicated, unsuitable for insufficiently ventilated rooms, soon out of order, and would only deliver the hot water at the place

where they were located. He greatly preferred a combination of both principles, consisting of a long coil of brass tubing situated directly above a number of large bunsen burners, with automatic gas-regulator and pilot jet. There should be a supplementary water storage tank, and the whole of the boiler, piping, &c., should be coated with non-conducting material. Several suggestions were offered as to securing the all-the-year-round use of the gas-cooker; and the author summed up the question, as including every care in respect to the efficiency of stoves in use, and active canvassing, advertising, and demonstrating to attract the attention of those who did not at present use gas. Newspaper advertising was probably the best; circulars and handbills being of doubtful value. A poor canvasser was worse than useless, but a good one was beyond description. Ordinary districts should support a canvasser to each 5000 inhabitants at the very least.

Mr. R. M. Searle commenced the discussion by remarking that most of the hindrances mentioned in the paper arose from ignorance, and illustrated the need for canvassing and demonstrations. The place for an inefficient stove was the scrap heap; and a serious difficulty in his district (Atlanta, Ga.) was the failure of the servants to keep the stoves clean. It was the policy of the company to keep the stoves in good repair, and he had a staff of six men to look after 4000 stoves. He did not agree that free installations were a mistake, as one of the best records in the country was secured on that line; and he knew results covering 30,000 stoves in various companies, all of whom were paying good dividends. In Kansas, 12,000 stoves were fixed on the free system in eighteen months. Mr. G. Clarke said that the population of Kansas was 200,000, and there was also much personal canvassing, and a gas rate of only 2s. 1d. per 1000 cubic feet. Mr. Paul Doty believed that the question asked by the title of the paper might be answered in as many different ways as there were different circumstances and individualities. He strongly advocated the education of the consumers, and the encouragement of the use of the gas-stove in public and private cooking schools and classes. He had placed a stove in a registry office, and arranged that servants waiting for employment could be instructed in its use; and also distributed cookery books and pamphlets. The remedy for excessive consumption was a knowledge of how to read the meter. He advocated free service and fixing; but not a free stove. It should be sold at the regular trade price, and local dealers could then be allowed a commission on every stove sold. He dealt in gas-fittings of all kinds, and had five canvassers at work on commission. As the result of this policy, he had sold this year, up to the present date, 635 stoves and 321 hot-plates. The appliance department paid for itself, including the exclusive services of a lady lecturer who gave demonstrations at the offices, superintended a free lunch on the discount days (the 14th and 15th of each month), investigated complaints, followed up new users, &c. As to advertising, gas men had not always the ability to get up good advertisements, and he advocated the formation of a central advertising bureau for supplying suitable matter and cuts. Mr. H. H. White had been very successful with heating by means of the Wolfe gas-radiator; but he could not report equally good results in respect to cooking-stoves. Seven of the largest churches in his city were heated exclusively by gas. Mr. Littlehales said that at Syracuse, N.Y., he had placed 2000 cookers in two years. Canvassing, properly done, gave the best results, and he believed in the two-meter system, whether there were two prices or not. Mr. Graves reminded the meeting that every gas manager did not use a gas-cooker in his own house for the whole twelve months, and that example was stronger than precept. As to canvassers, a good salesman earned his salary and more. Mr. Pinckney believed in encouraging cooking classes, and had seen practical evidence as to the value of such a course in his own family. Mr. Pratt saw to the placing of every stove, and followed it up by a visit from an experienced lady instructor. Mr. Harbison had followed the maxim of "practice what you preach" for years; and not even a pound of coal was used in his house. As to water heating, he had an efficient instantaneous apparatus made by a firm in Chicago. He was at present laying services to a row of flats, in which gas would be used exclusively for cooking. Mr. A. E. Forstall had tried a gas bath-heater in his own house, but it was not such a success that he could recommend it to his friends. The President was doing very well on the hire system. At first he put out 1000 stoves, and the results were so satisfactory that another 2000 were placed. The average consumption of gas per annum was 20,000 cubic feet per stove; and the cost involved in their maintenance was a mere trifle.

Mr. Doherty, in replying, said that, of course, it was easy to get rid of a large number of stoves by supplying them free; but he preferred the policy indicated in his paper. As to removing all objections on the score of cost, to do that it would also be necessary to give away the gas. The advantage of charging for everything at a fair price was that the cost of the gas was not loaded, and it could be sold at a low figure. He agreed that cookery schools and classes should receive every possible encouragement and support, also with taking payments for stoves by instalments, as many users of such appliances could not, or did not care to, pay the whole sum at once. A central advertising bureau might be a good thing; but every manager should know best how to deal with the conditions governing his own district.

(To be continued.)

THE PRESENT POSITION OF ACETYLENE LIGHTING.

Dr. Paul Wolff's Berlin Lecture.

(Concluded from p. 1104.)

An illustration of the complete Pictet-Wolff plant is given in the diagram, fig. 1. The carbide is introduced by hand through the shoot *a*, and falls down the inclined plane *b* on to the sloping grid *c*. The gas is thereupon generated, and, rising vertically upwards, is prevented by the water-seal from escaping through the shoot whereby the carbide is introduced. There is an overflow-cock G on the tube B; and an overflow-pipe H, provided with a cock J, on the top of the generator also leads into the admission shoot. The outlet K leads to the purifying plant; while a second outlet goes direct to the gasholder. Each of these outlets can be closed by a cock. When the generator needs cleaning, both cocks are shut, and the cock J opened. Water

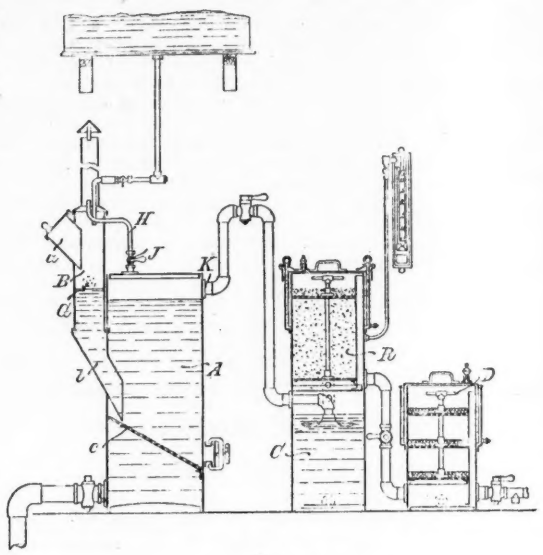


FIG. 1.

is admitted until it overflows at the admission shoot. By this means all the gas is driven out of the generator, and escapes by the chimney. The lime water may now be run off, and air allowed to enter the generator, as no trace of gas can be present in it. Similarly, after cleaning, the air is expelled from the generator by admitting water until it overflows at the admission shoot. The cock J is then closed, and the cock on the pipe which affords direct communication between the generator and the gasholder is opened, and gas is allowed to flow from the latter to the former, and force out water from the generator until the pressure of the gas is equal to that of the water-seal. The space above the level of the water in the generator is thus filled with purified gas. Carbide is then introduced, and the gas generated forces more water out by the overflow-pipe, until the working level of the water is established. The overflow-cock is then shut. The acetylene generated is thus quite free from air, and an explosive mixture of air and acetylene cannot be produced in the generator.

The acetylene passes from the generator into the washer C, which contains a solution of calcium chloride, which removes ammonia and a part of the sulphuretted hydrogen from the gas. The phosphuretted hydrogen is but little affected by this operation, and it is abstracted in the purifier R, which contains chloride of lime (bleaching powder) either alone or mixed with other substances. One such purifier answers in small installations; but several of the purifiers in series are required in large installations. The gas is dried and freed from the chlorine which it has taken up from the bleaching powder in the vessel D, and then passes on to the gasholder, station meter, and governor. In large installations, condensing apparatus is placed between the generator and the washer for the purpose of cooling the gas, and removing from it aqueous vapour and particles of lime and carbon.

The extremely high illuminating power of the acetylene flame is caused by the large proportion of carbon in, and the high temperature of combustion of, acetylene. The large quantity of carbon, which when raised to incandescence gives the gas so high an illuminating power, causes difficulty, in that the atmospheric oxygen fails to reach the carbon in the interior of the flame. Thus a portion of the gas is apt to escape complete combustion, and the flame appears smoky. The trouble occurs with other substances, such as oil gas, benzol, ligroin, &c., which are rich in carbon. If acetylene were burnt from an ordinary gas-burner, the smokiness of the flame would be very much in evidence. The mixing of air with the gas must be much more intimate than it is possible to secure with the ordinary burners. Various means are adopted in order to compass this end.

When acetylene is consumed in an ordinary gas-burner, the air only reaches the exterior parts of the flame, and in the core combustion is not secured. If the orifices of the burner are narrowed so that the thickness of the flame is reduced, while its surface remains undiminished, contact of air with the gas may be obtained throughout the flame. Or the pressure at which the gas issues from the burner may be increased in order to induce a stronger flow of air to the flame. It has then to be decided at what point the admixture of air and gas can best be carried out. Another method of securing more intimate contact between the air and the acetylene is by the dilution of the latter with another gas. Either incombustible diluents, such as air and nitrogen, or combustible diluents such as hydrogen and methane, may be employed. Owing to the wide limits within which mixtures of air and acetylene are explosive, air cannot with advantage be mixed with the gas until the latter has reached the burner. An air supply such as is afforded in the Bunsen type of burner may be used, provided it is so regulated that a non-luminous flame is not produced.

The faults of most acetylene burners are that they become choked in a comparatively short time, and that the flame is smoky. These troubles are in no way due to impurities in the gas, but occur with pure acetylene, though impurities may accelerate the choking of the burners. The ease with which acetylene decomposes is the real cause of the troubles. The heat of the flame causes a polymerization of the acetylene to take place even within the burner, and the products block the orifices. Burners in which the gas issues from a slit, such as are commonly employed for coal gas, cannot be used for acetylene, as the slit very rapidly becomes blocked up. Burners with two orifices, such as the fishtail burner, answer rather better, and small Bray burners were at first used almost exclusively for the consumption of acetylene. In the Bray burner, the inclined perforations from which the gas issues are in porcelain-like material encased by brass. The burner gives an elegant flame, and affords a high photometric efficiency; but it becomes blocked up in a short time, and frequently needs cleaning. When burnt from such small orifices, acetylene will inevitably block them up; but, for the reasons stated above, larger orifices are useless for the combustion of pure acetylene. Hence the only practicable alternative is to mix the acetylene with other gases; and of these air is the most convenient, as the admixture can be effected in a species of bunsen burner. The construction of the burner can be modified considerably.

FIG. 2.

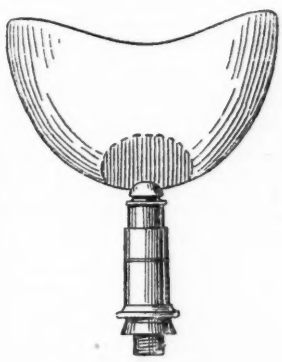


FIG. 3.

Two forms of this type of burner which have been found in Germany to answer well are shown in figs. 2 and 3. In the former, the two metal tubes incline towards one another at an angle of 90°, and each is provided with a steatite cap, in the lower part of which is the fine orifice from which the gas issues. This is surrounded by four holes, through which the jet of gas draws air; and the mixture of acetylene and air issues from the wide orifice in the top of each cap of the burner. The two jets then impinge on one another, and form a butterfly flame above the burner, and not in contact with it. The burner openings thus remain comparatively cool; and as they are not very small, they can be cleaned without difficulty. The burner shown in fig. 3 is an ordinary hollow-top slit burner mounted on a metal case, in the base of which is the gas orifice surrounded by air-inlets. This burner has answered extremely well. The efficiency of the burner shown in fig. 2 is from 35·5 to 41·4 English candles per cubic foot of acetylene; and that of the hollow-top burner from 38·5 to 41·4 candles per cubic foot.

The heat of combustion of acetylene greatly exceeds that of coal gas, being as 140 : 55; and consequently a very high temperature can be obtained from acetylene when burnt in bunsen burners specially designed for its consumption for heating purposes. Several of these burners which answer well can now be obtained. Difficultly fusible metals, such as copper and nickel, can be fused in a crucible by an acetylene bunsen flame.

The calculations of the cost of acetylene lighting which have hitherto been published are for the most part fallacious; they have been the work of partisans. It is, however, difficult to make an exact computation, as the price of carbide varies very much. A price of 40 pfennige a kilogramme (equal to 2·18d. per pound) will not be far from correct, though a reduction may be expected within a year or so. The practical yield of acetylene is about 300 litres per kilogramme (4·86 cubic feet per pound) of carbide. If 10 per cent. be allowed for amortization and loss, the cost of a cubic metre of acetylene becomes in round figures 1s. 6d. (=about £2 2s. 6d. per 1000 cubic feet). Coal gas costs on an average (in Germany), 17 pfennige per cubic metre (4s. 9¾d. per 1000 cubic feet). Then assuming that 0·443 cubic foot of acetylene gives, on an average, a light of 16 English candles, and that 7·41 cubic feet of coal gas in an ordinary batswing burner, and 1·29 cubic feet in a Welsbach burner, produce the same light, then the cost of the light will be as follows: From acetylene, 0·226d.; from coal gas in a flat-flame burner, 0·41d.; and from coal gas in the Welsbach burner, 0·074d. The same light from incandescent electric lamps would cost, on an average, 0·48d. Acetylene, therefore, is cheaper than coal gas (at the price assumed above) consumed in ordinary burners, but is considerably dearer than that gas when consumed in the Welsbach burner; and statements to the contrary are calculated merely to delude the public, as they cannot be substantiated. It should, however, be remembered that a 16-candle light cannot be obtained by a Welsbach burner; while acetylene affords flames of considerably lower illuminating power if desired. Moreover, the mantles and chimneys of the Welsbach light frequently need renewal. Researches made recently by the author indicate that an acetylene light on the Welsbach system can be produced, and is more economical than the open acetylene flame.

Acetylene has at present no prospect of competing with coal gas in large towns. In small towns, in the country, in factories, at railway stations, and in lighthouses, and wherever gas and electricity are not obtainable, it should have no difficulty in supplanting petroleum. One advantage in decorative lighting which acetylene has is that the pipes for the supply of the burners are very much smaller than those for coal gas, because the consumption is so much less.

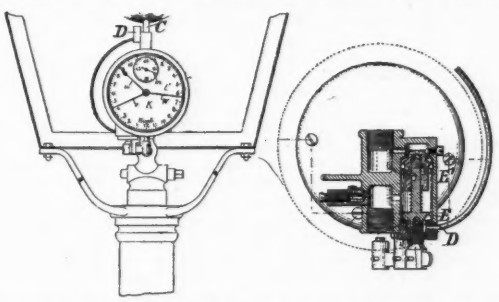
As an instance of the progress acetylene lighting is making, it may be mentioned that installations for 1000 and 2000 burners have recently been supplied to two small towns in Germany.

REGISTER OF PATENTS.

Lighting and Extinguishing Gas-Jets in Street-Lamps.—Frossard, J., of Parrentruy, Switzerland. No. 24,013; Oct. 18, 1897.

This invention comprises the combination of wheelwork with a device intended to connect or disconnect alternately, at fixed hours, the inlet and feed pipes for the gas, and connect at other times the feed pipe and the pilot pipe, by a double-seat valve connected with a valve-operating lever acted upon by mechanism secured to a vertical supporting plate.

The apparatus is shown as attached to a street-lamp column, and (to a larger scale) in vertical section. The points of novelty comprise: (1) A double valve E E^1, with a spiral spring and a pin provided with a taper as shown. (2) Wheelwork, the driving-spring of which acts, on the one hand, upon a train intended to indicate the hour, and, on the other hand, upon a train intended to work the device for cutting off the light. (3) The combination of a wheel provided with pins with a lever and spring acting upon the device for cutting off the light. (4) A stopping and



starting device composed of a lever and bolt; the latter acted upon by means of the lever for stopping the butterfly, and the lever being combined with a barrel-wheel and with discs intended to release the butterfly at predetermined hours. (5) A device intended to heat the whole apparatus so as to prevent the oil used for lubricating the mechanism from freezing. (6) A case formed of a non-conductor of heat, and intended to protect the mechanism against the action of the sun. (7) The combination of a lighting-tube with a box D containing spongy platinum. (8) The lighting-tube provided with holes forming a line of gas reaching from some kind of mechanical lighting device (acted upon by means of the lever) to the burner C.

Prepayment Meters.—Cowan, W. & W. H., of Edinburgh. No. 24,049; Oct. 19, 1898.

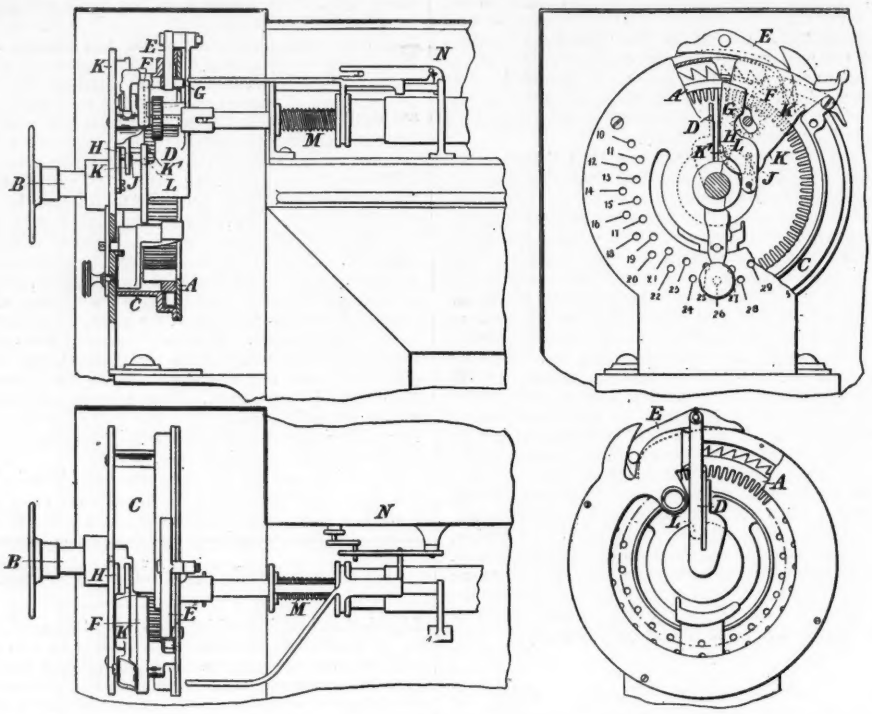
These improvements in prepayment coin-freed gas-meter mechanism, constitute modifications of, or additions to, the invention described in patents No. 13,200 of 1895, and Nos. 18,098 and 28,828 of 1896; the object aimed at being to "simplify the construction and manufacture of the prepayment mechanism, and also to enable the gas-valve to be closed more abruptly than hitherto, when the amount of gas paid for by the insertion of a coin or coins has been almost consumed, whereby the whole, or nearly the whole, of the gas can be supplied without any appreciable diminution of light, prior to the complete closing of the valve."

On next page is shown an elevation, a plan, an end elevation of a portion of a meter illustrating the improvements applied thereto (the covers

being removed for the sake of clearness), and a rear end elevation or back view.

In accordance with the first part of the invention, the patentees dispense with the toothed prepayment wheel as constructed hitherto, and substitute for it an internally toothed band or ring A, mounted concentrically with the outer or actuating shaft B, and retained in position within the casing C by a recessed flange and cover. The coin-carrier or pocket D (access to which is obtained by a slot in the side or front of the operator, as formerly) is mounted within the casing in such a manner that, upon the insertion of a coin into the carrier, a portion of it projecting beyond the pocket immediately enters between, or engages with, the teeth of, the band or ring A, thereby enabling the band to be rotated through the medium of the handle of the shaft B, to actuate the valve mechanism, and thus place at the disposal of the consumer a quantity of gas equivalent to that paid for by the coin inserted.

In order to re-set the internally toothed band A, and ensure the teeth being in a position to receive the coin upon each occasion that the mechanism is operated, a pawl E, as described in the second patent of 1896, is employed, but the periphery of the band itself is provided with teeth into which the pawl engages. The pawl, which works through an opening in the casing, is kept out of gear during the forward movement of the carrier D, by its pin mounting and bearing against the outside of the casing.



The internal teeth are extended sideways beyond the edge of the band, and a pawl F is provided at any suitable position upon the outer casing, and arranged to work therethrough, and engage with, the projected teeth, and prevent the rotation of the band in a backward position.

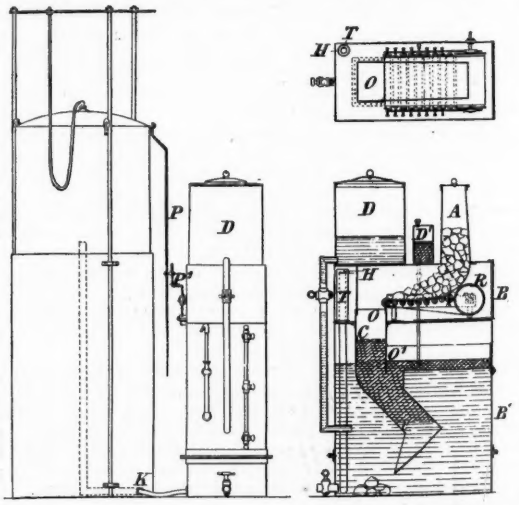
The internal teeth of the prepayment ring A are utilized as a means by which direct communication is effected with the screwed rod of the measuring-out mechanism of the meter (as described in patent No. 21,108 of 1894), by providing the extremity of the rod with the pinion G, which gears with the internal teeth of the ring.

The operating handle is constructed so as to have a "little play" on the shaft (as described in patent No. 18,141 of 1891). When so arranged, it carries a shield, which closes the entrance to the slot before the coin pocket can be moved out of the normal position. Otherwise, a shutter is employed (arranged as shown), consisting of a shield H pivoted to the inside of the casing, and having a pin or projection J working into, or engaging with, a slot formed in a weighted portion K, also pivoted to the casing. The portion K is also provided with a pin or projection K^1, which, when the carrier is in its normal position, enters, by the weight of the portion K, a notch or recess L formed in a disc, which moves with the coin-carrier—thus keeping the coin-slot free. Immediately, however, that the knob B is actuated, and the disc rotated, the pin rises out of the recess L, and rides on the periphery of the disc. The movement thus given to the portion K is communicated to the shield H, thereby closing the coin-slot. The portion K is also provided with a trigger, by which the shutter can be actuated by a rod, which advances through the medium of the screwed rod or tube M for actuating the valve or stop of the meter (as described in patents Nos. 21,108 of 1894 and 28,828 of 1896) when the full number of coins have been inserted. This keeps the slot closed until a quantity of gas at least equal to the amount supplied for a single coin has been consumed, when the rod is receded and the slot again opened. The face of the trigger is inclined so that the rod coming in contact with it displaces it, and causes the portion K to rotate slightly upon its pivot, in the same manner as when actuated by the notch and pin before referred to.

In accordance with the second part of the invention, a double-armed or bell-crank lever is employed, pivoted upon the side of the supplementary valve-box or casing N. The lever, which has one arm considerably longer than the other, is so situated that, upon the working back of the tube M, a pin or projection upon an extension carried by the tube is caused to come in contact with the shorter arm of the lever, and so lowering the other arm, which engages with the crank of the valve-shaft, and closes the valve. By reason of the unequal lengths of the arms of the lever, the valve can be closed with a shorter travel of the screwed tube than when the projection engaged directly with the valve-crank—thus enabling the valve to be held full open for a longer period than hitherto. In cases where it may be desirable to employ the lever to open the valve as well as close it, the end of the longer arm is fashioned as a "fork," which engages with the pin of the valve-crank. When so arranged, the pin or projection which operates the lever should bear slightly against the underside of it, while gas is being consumed, till it enters a notch or recess just as it begins to press on the lever's shorter arm. The pressure of the pin then brings the lever into an angled position, and closes the valve. The valve is again opened, upon a fresh purchase of gas, by the pin working out of the notch; thus causing the lever to resume the horizontal position, during the continuance of which the valve will remain open.

Acetylene Generating Apparatus.—Reibel, J., of Angouleme, France. No. 27,288; Nov. 20, 1897. Date claimed under International Convention, May 14, 1897.

This apparatus for generating acetylene is said to work "without any appreciable development of heat and in an automatic manner, to suit the demand of gas required for use." The first point is achieved by causing the carbide fragments to fall, one by one, into a large volume of water. The second point is attained by a transmission device controlled by the descent of the bell-shaped slide cover of the gasholder. The apparatus (as shown) comprises a gas generator and a holder. The former is composed of two sheet-iron boxes B B^1, placed on top of one another, with an interposed layer of felt. The gasholder has an interior tube, arranged along the axis of the slide cover, which serves for carrying off the gas at K. The carbide is enclosed in a receptacle A; and it rests upon the curved sheet-iron base, so as subsequently to pass upon an endless leather band running over rollers R. The sections gradually increase in the downward direction. The band serves to draw the carbide towards the discharge opening O.



The carbide fragments fall into the box B^1, and pass into a conduit C, which conveys them into the water. In this box a large volume of water is stored. If no special provision were made, the moisture set free by evaporation and passing through the orifice would attack the carbide contained in the box B. This inconvenience is, however, guarded against by pouring on top of the water, a liquid of lesser density and not subject to act upon the carbide—such as petroleum-oil. The conduit has two angular bends. Thus, when the carbide comes in contact with the water, the disengaged gas is prevented from leaving through the orifice. A few bubbles only traverse the petroleum layer at O^1. The remainder escapes above the water surface. The gas is collected at the upper part of the cylinder H by means of a tube T (which is made sufficiently wide to avoid variations of pressure in the generator), and then re-descends across the volume of water.

In order to ensure that the movement of the band may not commence until the bell-shaped slide cover in its descent has reached a certain point, the connecting-rod P is provided at its lower part with a slotted guide; and the lever P^1 is stopped at one point by a catch. A counterweight has the tendency of constantly bearing against this catch.

The upper box B carries, besides the carbide receptacle A, two cylindrical receivers D and D^1. The small receiver serves for the introduction of petroleum oil into the generator; the large one, for the supply of water. At the bottom of the box B^1 is a discharge-cock, to expel the water charged with lime and impurities.

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gnition Device for Gas-Burners.—Jurgens, E. & J. F. C., of Hamburg, and the Automatic Universal Gas Lighter, Limited, of Copthall Avenue, E.C. No. 29,828; Dec. 16, 1897.

This invention relates to the manufacture of igniting-bodies having platinum-black carriers that are said to be more porous and less affected by high temperatures than others heretofore made. The patentees take 48 to 50 parts by weight of pure and finely levigated infusorial earth (siliceous marl—such as is employed in the manufacture of dynamite—which is capable of taking up one-and-a-half times its weight of liquid), alone or with an addition of about 4 per cent. of carbonate of magnesium, or kaolin, and a binding agent. The mass is stirred up with water and well kneaded; and from this plastic mass small "pills" are formed which are dried in the air. The pills are then rendered red hot in a muffle-furnace, and are impregnated, while in a perfectly dry condition, with platinic chloride until they have taken up 50 parts by weight of pure platinum. Then the pills are again dried in the air, and afterwards heated (with exclusion of air) in a current of pure dry hydrogen or water gas, so as to convert the platinic chloride into platinum-black, which "then remains in the pores of the pills in a state of extremely fine sub-division."

Impregnating the Packing Material employed for Gas-Pipe Joints, &c.—Rosenthal, K. E., and Billwiller, J., of Berlin. No. 16,042; July 22, 1898.

The object of this invention is similar to the one described below; the claim in this case being for "a process for impregnating the packing materials used for joints, &c., in pipe conduits, gas-reservoirs, and the like, the distinguishing feature of which is that the packing materials are impregnated with bodies of the kind which enter into combination with the component parts contained in the gases or other specially introduced gases or substances, so that by chemical reaction an increase in volume occurs, and thereby a gas-tight closing is produced at any permeable spot."

Rendering Gas-Tight the Sides or Walls of Gas-Reservoirs, Pipe-Conduits, and the Like.—Rosenthal, K. E., and Billwiller, J., of Berlin. No. 16,043; July 22, 1898.

For the purpose of limiting as much as possible the loss of gas which occurs by its diffusion through the sides or walls of such receptacles as those named above, the patentees suggest dissolving in alcohol, metallic salts—for example, chloride of iron—and impregnating the sides of the reservoirs, pipes, and the like, with the solution. The alcohol evaporates, leaving the salts in a very finely-divided condition; and this penetrates into the pores of the material to be made gas-tight. When the receptacles are charged with gas, there is formed (in consequence of the component parts, such as ammonia and sulphide of hydrogen, found in all illuminating gases) either oxyhydrates or sulphates, the volume of which is considerably greater than that of the salts dissolved in the alcohol. Where there is a sufficient quantity of ammonia contained, the process runs according to the following equation:—

$$Fe_2Cl_6 + 3\,H_2S = Fe_2S_3 + 6\,(HCl)$$
$$6\,(HCl) + 6\,(NH_3) = 6\,(NH_4Cl)$$

the resulting end-product being sulphide of iron and ammonium chloride

The gas-reservoirs, pipe-conduits, and the like, can also be made gas-tight by coating the surfaces with tar with which an alcoholic solution of Fe_2Cl_6 is previously mixed, and after the alcohol has evaporated introducing a charge of gas. In this case, the chemical re-action is slow.

If the tightening effect is to be brought about quickly, the reservoirs, &c., prepared with the impregnating body are charged, previously to being used, with a mixture of ammonia and sulphide of hydrogen, and kept for some days under pressure.

[The above patent, as well as No. 16,042, were referred to in the "Journal" for the 8th inst., p. 1034.]

APPLICATIONS FOR LETTERS PATENT.

23,363.—Kinsey, H., "Generating acetylene gas." Nov. 7.

23,369.—Beese, R., and Perlich, A., "Improvements in gas-burners with self-igniting Auer filament." Nov. 7.

23,385.—Möller, J. C. H., and Schaefer, C. W. C. L., "Acetylene lamps." Nov. 7.

23,389.—Sapy, S., Stettner, G., Hegedüs, L., and Gyurich, S., "Water-meters." Nov. 7.

23,404.—Clerk, A., "Incandescent lighting and heating." Nov. 7.

23,451.—Paul, F. W., "Improvements applicable to the passages and valves of gas-fired heating or melting furnaces." Nov. 8.

23,547.—Simpson, S., "Governors for gas and other fluids." Nov. 8.

23,559.—Astresse, P., "Gas-engines." Nov. 8.

23,576.—Smith, F. W., "Generating acetylene gas." Nov. 9.

23,625-6-7.—Thompson, W. P., "Four-stroke gas and like motors." A communication from the Gesellschaft für Automobilwagenbau Gesellschaft mit beschränkter Haftung. Nov. 9.

23,675.—Thiersant, H. de, and Coulson, W. A., "Generators for acetylene gas." Nov. 10.

23,683.—Golby, F. W., "Automatic gas-lighting devices." A communication from R. S. Lucas. Nov. 10.

23,686.—Nobes, G., "Automatically shutting off the supply of gas in case of fire." Nov. 10.

23,730.—Atkey, A. R., "Acetylene lamps." Nov. 11.

23,908.—Glover, R. T. & J. G., "Pad and other locks and like fasteners, with means for preventing surreptitious opening of same." Nov. 12.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Carburation of Coal Gas.

Sir,—Being interested in the solution of the difficulties arising from naphthalene deposits, I naturally read with much pleasure the paper on the subject communicated by Mr. Botley to the Southern District Association of Gas Managers, and the discussion which followed, as reported in your issue of the 15th inst.

The members taking part in the discussion appeared to be perfectly satisfied that Mr. Botley had proved that his process was an effective remedy for naphthalene deposits; but they all seemed to have some difficulty in getting at the manner in which the result was brought about. Mr. J. W. Helps, of Croydon, made it fairly evident that the question of naphthalene deposits is one of variation of temperature, leading to a variation in the vapour tension, and indicating that an explanation of the action of the process will be found in the study of these conditions. Ever since reading a description of Mr. Botley's process in one of your former issues, I have had no doubt but that it would prevent naphthalene being deposited in the solid state—simply because the application of the process brings into action the conditions of temperature and vapour tension referred to by Mr. Helps.

The first stage of the process is to compress a portion of the gas to be acted upon to a pressure of 75 lbs. per square inch. The mechanical energy expended in thus compressing the gas is converted into heat energy. The gas becomes heated; and this sensible heat is more or less dissipated during its passage into, and through, the compressing reservoir. The second stage in the process is to employ the compressed, and more or less coated, gas to drive into the bulk of the gas, in an extremely minute state of mechanical division, a quantity of hydrocarbon oil, the greater part of which has a vapour tension so low that it cannot vaporize into the gas, and must necessarily remain in the liquid condition, though in an extremely fine state of mechanical division.

Now what are the conditions that are thus brought about? Although modified in degree, they are yet exactly those which have been employed when it was desired to extract hydrocarbon oil from coal and shale gases by lowering their vapour tension till they assumed the liquid form. The highly compressed gas, on expansion and doing work, becomes suddenly reduced in temperature, and chills the gas into which it is allowed to expand. This sudden lowering of temperature reduces the vapour tension of the water vapour diffused through the gas, and causes a part of it to be precipitated in the liquid form, which accounts for the water found, resulting from the action of the process; but the precipitation of this water has nothing to do with the naphthalene. The same conditions, however, which caused the precipitation of the water vapour would also reduce the vapour tension of other volatile substances diffused throughout the gas; and naphthalene, being one of these, would be precipitated. But to these physical conditions, there would be superadded, in the case of hydrocarbon vapour diffused through the gas, the solvent affinity of the liquid oil in an extremely fine state of division; and each minute particle would take up in solution a small portion of the hydrocarbons diffused through the gas. As the naphthalene would be the main hydrocarbon with the lowest vapour tension, it would be taken up in solution in the greatest quantity; and there is no doubt that, just as stated by Mr. Browne, the larger liquid oil particles, on becoming thus loaded with naphthalene and other hydrocarbons, would drop out and be found in the drip-wells, while those in a sufficiently fine state of division would be carried forward in the current of gas, and, if not mechanically rubbed out against the sides of the pipes or fittings, would reach the burners.

It will thus be seen that the result, instead of being due to an artificial, unexplainable vapour tension being created, and the naphthalene so carried forward, the reverse is the cause of the deposit being prevented. The real cause is the lowering of the vapour tension of the naphthalene—not the raising of it—in presence of a liquid that can take it up in solution, and keep it in the liquid form whether it is deposited or carried forward. That this is the theory of the action of the process, is further borne out by the fact that the portion of atomized oil which is precipitated is heavier in gravity, and has a pungent smell characteristic of naphthalene and other hydrocarbons dissolved out of the gas.

It will thus be seen that the system resolves itself into a modified scrubbing process applied to the gas subsequently to its leaving the governors—in short, a scrubbing process carried out in the mains, services, meters, and fittings—and that part of the scrubbing fluid, when in a fine enough state of division, accompanies the gas through the burners and assists in giving more luminosity to the flame, while the other portion of the scrubbing fluid, not being in a sufficiently fine state of division, falls or is rubbed out of the gas, and is deposited all over the distributing plant. While it is quite true that the naphthalene is not deposited in the solid form, it is yet deposited, and very probably to a greater extent than it otherwise would be, owing to the solvent affinity of the atomized oil lowering its tension. But, though deposited, being held in solution in the accompanying liquid oil, it does not stop up the pipes, because the portion dropping out in the mains and services will flow into the drip-wells, and can be pumped out and conveyed back to the works. The portion, however, dropped or rubbed out in the meter and internal fittings, may not be so easily disposed of.

Wm. Young.

Peebles, Nov. 19, 1898.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Tuesday, Nov. 15.

(*Before Mr. Justice* ROMER.)

Hayes v. The New Incandescent Gas Company.

Mr. FLETCHER MOULTON, Q.C., Mr. LEVETT, Q.C., and Mr. WALTER appeared for the plaintiff; Mr. NEVILLE, Q.C., Mr. RUFUS ISAACS, Q.C., and Mr. G. F. HART represented the defendants.

When the hearing of the case was resumed this morning,

Mr. *Duncan* was re-called, and further examined by Mr. HART. He said up to Nov. 19, 1897, Mr. Tiano had not stated definitely that the patents were to be purchased by an American company; and therefore he was not at all indisposed, as he said in his letter of that date, to let the negotiations go off. In his reply, Mr. Tiano said he was told the purchase was by an American gentleman to launch a company in America. This was the turning point of the negotiations. Before that, Mr. Tiano only said what he thought, or conjectured; but after that he spoke as from positive knowledge. On Nov. 26 Mr. Tiano wrote that he had just met the American gentleman, and on the following day he saw him in Paris. The litigation in England did not affect the De Mare patents, which were for burners; it only affected the mantles. On Nov. 29, they met again; and the formal offer of Mr. Tiano in the letter of that date was made and sent by witness to London, with a recommendation that it be accepted. But for Mr. Tiano's representations, the defendants would never have entertained the offer. He had no idea that the Welsbach Company or Mr. Moeller were interested in the purchase. The principle of the De Mare burner was involved in the new burner now being introduced by the Welsbach Company; and therefore it was of the greatest importance to the defendants that the De Mare patent should not be in the hands of this Company. Witness produced one of the Welsbach Company's new burners.

Cross-examined: The new Welsbach Company was formed in 1898. The defendants bought the English De Mare patents from the Liquidator of the French Company in February, 1897. They had not made any use of them, and at the time had no idea of doing so, except as regarded the collodion process. After the beginning of the negotiations with Tiano, he attached some importance to the burner patents. Witness, when cross-examined as to his intentions in selling the patents, maintained that he was willing to take the risk of an American company competing against his own Company and the Welsbach Company in England; but he would not have entertained the idea of selling them to the Welsbach Company.

In re-examination, witness further explained how the ownership of the De Mare patents affected the business of incandescent gas lighting.

Professor *Vivian B. Lewes* was called; and a question was put to him as to the principle involved in the De Mare patent No. 10,497 of 1894.

Mr. LEVETT, however, objected; and an argument ensued as to the admissibility of such evidence.

Mr. NEVILLE contended that he was entitled to give the evidence to show the materiality of the misrepresentations alleged, and that defendants would be injured if the contract were specifically performed.

His LORDSHIP decided that he could not go into evidence to show whether the Welsbach Company were now making a burner in accordance with the De Mare patent.

Mr. NEVILLE said that, under these circumstances, he could not carry the evidence further, and must deal with the case as it stood. He then submitted, in the first place, that there had never been a clear acceptance of the offer; but on this point his Lordship decided against him. He then proceeded to argue further the principal point he had made in his opening—viz., misrepresentation and concealment of material facts.

Mr. MOULTON, in reply, contended that there had been no misrepresentation; that there was no evidence that the Welsbach Company were benefited by the contract; and that the only object for which the defendants could desire to retain the exclusive right to the De Mare patents, were that they might be in a position to bring blackmailing actions.

His LORDSHIP, in delivering judgment, said this case was in some respects a difficult one; but the conclusion he had come to was that the plaintiff was entitled to relief. The first point he had to decide was whether there had been a binding contract between the parties. Undoubtedly when the letter of Dec. 3 was written it enclosed a Solicitor's letter of Dec. 1; and the acceptance contained in the letter of Dec. 3 must be taken to have been subject to the points set out in that enclosed letter. The question was whether the points so set out were accepted by the plaintiff; and in his opinion they were. The acceptance need not be in writing. All the plaintiff had to show was acceptance; and after what had passed it would be impossible for him to hold that there had not been acceptance. The draft assignment of the patent, and the draft licence in pursuance of the contract, were sent on behalf of the plaintiff to the defendants; and the draft assignment was returned to the plaintiff, and by him engrossed and executed. After that it appeared to him impossible to say that the plaintiff had not accepted the condition, and that there was no binding agreement. The next point raised by the defendants was that there was in substance a misrepresentation as to the persons for whom the patents in question were bought. After all that had been said with reference to the decided cases, the law could not be better expressed than in the language of Lord Justice Fry: "The law seems now to be that where one person is deceived as to the real party with whom he is contracting, and that deception either induces the contract or renders its terms more beneficial to the deceiving party or more onerous to the deceived, or where it occasions any other loss or inconvenience to the deceived party, there the contract cannot be enforced against him; but that where none of these circumstances can be shown to follow from the deception, the contract may be enforced." The points raised by the defendants were, first, that there was concealment—that the contract was negotiated on behalf of the plaintiff by Mr. Tiano, who well knew that the defendants were only willing to sell the said patents on the condition that they should not be used by their trade rivals, or by any person in opposition to them, and who concealed from the defendants the fact that the plaintiff, for whom he purported to be acting, was the mere nominee of the Incandescent Gas-Light Company, and that he was purchasing the patents for the benefit of the last-named Company or some person or persons connected therewith. The essence of this was that the real buyers were the nominees of the Incandescent Gas-Light Company, and that the purchase of the patents was made for the benefit of the Company. Now he did not mean to say that there were not some suspicious circumstances connected with the case, which personally he should have been glad to see cleared up. But he could only take the evidence as it stood; and in doing so, he could see no sufficient reason for distrusting the statement of Mr. Robinson, when he said that the purchase was made to protect himself and his partner Mr. Kern, as the owners, of what were called the Kern patents, and that the Incandescent Company had nothing to do with it. Even if he had seen his way to admit the evidence which the defendants sought to adduce, to the effect that the present Welsbach Company were now using a burner made substantially on the principle of the De Mare patent, this would not, in his opinion, have advanced the defendants' case; so that the conclusion he came to was that the substance of the plea on the ground of concealment—namely, that the purchase was for the benefit of the Incandescent Company, or some person or persons connected with them—had not been established. It could not be said, in his opinion, that Messrs. Robinson and Kern represented that Company, or were connected with them in the sense implied in the phrase. All that Robinson and Kern had to do with the Company was that they had, as owners of the Kern patent at the time, given to the Managing-Director of the Incandescent Company, in his own name, an option (which at that time was not executed) of purchasing the Kern patents. No doubt Mr. Robinson stated that his object in buying the De Mare patents was to protect the Kern patents, and to prevent anybody attacking them. The next point in the defence was that Mr. Tiano represented that the purchase was being negotiated by him on behalf of a person in America, who was buying gas patents for the purpose of floating a company in that country, and that they were not intended to be used in opposition to the defendants; whereas in truth the purchase was being negotiated on behalf of the Incandescent Company for the purpose of competing with the defendants. As he had said with regard to the former point, this was not established; and on the evidence before him he could not find that any misrepresentation of any kind was proved. The purchase was being negotiated by two American gentlemen. No doubt their object was to protect the Kern patents. But they bought the patents in question themselves; and even if it were a material statement at all for the purpose of the action that Robinson and Kern intended to float a company in America, it was not proved to be untrue. The misrepresentation alleged, therefore, was not proved. Now that the facts were all out, and one knew exactly what it was the defendants complained of, it only came to this—that by the defendants parting with the De Mare patents, the Incandescent Company, or their assignees the Welsbach Company, supposing the option which existed to buy the Kern patents was exercised, were enabled to get the benefit of the Kern patents, because it prevented these patents being interfered with by means of the De Mare patents. It did not appear to him that this was an injury which was directly referable to, or directly concerned with, the representation made, even assuming it to have been not strictly true. He must accordingly grant the relief asked, and decree specific performance in the usual form, with costs. The counter-claim would be dismissed.

Mr. LEVETT said he did not ask for damages; and as the assignment had been signed and sealed, he should simply ask for an order that on payment of the £750 it should be delivered.

Mr. ISAACS suggested that it should be referred to Chambers to settle the form of licence under the contract.

His LORDSHIP said the plaintiff must undertake to grant a licence, to be settled in Chambers, if necessary.

Mr. ISAACS then asked for a stay of execution.

His LORDSHIP said he could see it was an important case.

Mr. LEVETT suggested that if a stay were granted, some terms should be imposed. The defendants had commenced an action against the Welsbach Company claiming to be owners of these De Mare patents; and if a stay were granted, the proceedings in that action should be stayed.

Mr. ISAACS said he did not know that Mr. Levett appeared for the Welsbach Company.

Mr. LEVETT replied that he did not; but the defendants had no right to carry on proceedings as owners of a patent which the plaintiff had been declared entitled to.

Mr. ISAACS said he would give an undertaking that the action should not be proceeded with.

His LORDSHIP thereupon granted a stay of execution on the usual terms as to the payment of costs.

GREENWICH POLICE COURT.—Wednesday, Nov. 9.

(*Before Mr.* G. G. KENNEDY.)

London County Council v. South Metropolitan Gas Company.

A Question as to the Exemption of Gas-Works from the London Building Act.

In this case, the South Metropolitan Gas Company were summoned by the London County Council for an alleged infraction of the London Building Act, 1894, by the erection of a coal-shed at the Rotherhithe Gas-Works within the prescribed distance of 20 feet from the centre of the roadway, and without having first obtained the consent of the Council.

Mr. F. F. DALDY appeared for the County Council; Lord ROBERT CECIL (instructed by Messrs. Blyth, Dutton, Hartley, and Blyth) represented the Company.

Mr. DALDY, in his opening statement, called attention to the provisions of the London Building Act of 1894 which affected the case. He first quoted section 13 of part 2 of the Act, which provided that no person should erect any new building within the prescribed distance without the consent, in writing, of the County Council. Section 5, sub-section 4, defined the "prescribed distance" to mean 20 feet from the centre of the roadway, where such roadway was used for carrying traffic. There had, said Counsel, been some correspondence between the parties; but he did not think there was any question about this point as to the building which the Company had erected being within 20 feet of the centre of the

roadway. He would therefore leave that, and at once read a letter which Mr. Frank Livesey, the Chief Engineer of the Company, sent in reply to one written by Mr. Norman Scorgie, of the Rotherhithe Vestry. Mr. Livesey's letter, which was dated June 15, 1898, stated the position which the Company took in this matter. He wrote: "In answer to your letter of the 13th inst., referring to the building being erected in Rotherhithe Street, in addition to the exemption of gas-works from parts 6 and 7 of the Building Act, 1894, there is also a clause (No. 205) which we interpret in this way: That having, by a Special Act of Parliament, power to erect gas-works on this land, this new Act does not 'in any way take away, alter, prejudice, or affect any of the powers, rights, or privileges conferred upon a Gas Company by any Act of Parliament, and as existing immediately before the passing of this Act.' I may also remind you that land has already been purchased from the Company to widen the road at this point on the opposite side to that on which we are building; and we are still prepared, if absolutely necessary, to sell land on that side again. I therefore propose going on with the work." This letter gave a very good indication of the nature of the question between the parties. The Company had been good enough to furnish the Council with the section of their Act under which they said they possessed the statutory power or licence to enable them to put up the building in question within the prescribed distance of the centre of the roadway; and they relied upon this Act putting them in a statutory position different from that of an ordinary owner of property. The Act was the Surrey Consumers' Gas Act of 1854. The Surrey Consumers' Company afterwards became amalgamated with the South Metropolitan Gas Company; and he did not see the slightest ground for disputing that the South Metropolitan Company now possessed all the powers which the Surrey Consumers' Company previously held, whatever they were. Section 38 of that Act gave the Company power to purchase, by agreement, any lands which they thought requisite and proper for the purposes of their undertaking; and section 39 provided that, "Subject to the provisions in this and the said incorporated Acts contained, it shall be lawful for the Company to maintain, alter, and enlarge their existing works, and, from time to time, to construct and maintain such additional gas-works, gasometers, retorts, drains, sewers, machinery, and other works and apparatus, and such houses, buildings, and approaches upon the lands belonging to them, or which they may acquire under the powers of this Act, and to make and supply gas, or to contract for the making and supply of gas in such manner as they shall think proper," &c. The general scope of this section was to give the Company statutory powers to carry on their business; but there was another section which was rather important in his view. That was section 61, which provided that: "This Act, or anything therein contained, shall not extend, or be deemed or construed to extend, to prejudice, diminish, alter, or take away any of the rights, powers, privileges, or authorities of any commissioners, trustees, vestries, persons, or bodies whatsoever, under, and by virtue of, any Act or Acts for lighting, watching, cleansing, paving, or repairing any road, square, street, or other place whatsoever within the limits of this Act; but all such rights, powers, privileges, and authorities shall be as good, valid, and effectual as if this Act had not passed." To put it shortly, he thought this clearly showed that, under this Act, if the Company acquired a piece of land, they did so subject to the general liability of an ordinary owner of land. The position was this: That under the Surrey Consumers' Act of 1854, the Company obtained the right to buy land, which was, in general terms subject, he should say, to any Local Acts under which the vestries looked after the streets. Then in 1878 came the Metropolis Management Act, which was afterwards incorporated in the London Building Act of 1894. The 1878 Act bound the Gas Company just in the same way as a private owner. In support of his case, Counsel quoted the cases of the *City and South London Railway Company v. London County Council*, in 1891; *London County Council v. London School Board*, in 1892; and *Hampton District Council v. Grand Junction Water-Works Company* this year (*ante* p. 381). In conclusion, he submitted that this was not a case in which the Gas Company could fairly claim anything in the nature of a specific privilege or power within the meaning of section 205 of the Building Act of 1894.

Mr. *W. G. Perkins*, of the Surveyors' Department of the London County Council, put in plans of the Rotherhithe Gas-Works, showing the position of the building in question. It had been erected for the storage of coal, and was about 141 feet long, 36 to 40 feet in depth, and 34 feet high. The old boundary wall partly formed the external wall of the new building, which was less than 20 feet from the centre of the roadway. No consent had been given by the County Council to its erection.

Cross-examined: The boundary wall formed the side of the street; and partly the external wall of the new building. He did not know how long this boundary wall had been in existence, nor could he say anything as to the position of affairs in 1879.

At this point the hearing was adjourned.

Wednesday, Nov. 16.

Mr. *Perkins* (recalled) said that, during the adjournment, he had again surveyed the works; and it seemed to him there was plenty of room for the storage of coal independent of the new building.

Cross-examined: He was not a gas engineer. The new building partly extended over the site of one that formerly existed.

Mr. *J. J. Stokes*, who had been Clerk to the Rotherhithe Vestry since 1863, stated that Rotherhithe Street was widened by the Vestry about 1881; a portion of the land required being purchased from the Gas Company. (Witness put in a plan showing the old roadway as it existed before the widening took place.)

Cross-examined: As Clerk of the Vestry he had had no communication from the Company that they were prepared to spare a piece of land on the opposite side of the street if required for widening it. Rotherhithe Street varied in width a great deal.

Mr. KENNEDY: Will it make any difference if the Company are willing to give land on the other side of the street for its improvement?

Lord ROBERT CECIL said the Company were very anxious not to appear obstructive to any public improvement. They maintained that they had an absolute right to do as they had done; but if it was desired to widen the road, then they could sell a piece of land on the north side. On the south side, it was not possible, in the interests of their business, to spare any ground.

Mr. DALDY: That is not a formal defence to the point as to the centre of the roadway.

Lord ROBERT CECIL remarked that he would examine his witnesses before addressing his Worship.

Mr. *A. F. Browne*, Superintending Engineer of the Rotherhithe Gas-Works, was first called. He said the carriage way opposite the new coal-store was about 21 feet wide; but the street narrowed considerably in places. The boundary wall was erected at the time of the widening. Both to the east and west of the new coal-store, there were standing buildings in line with the boundary wall. The coal-store was behind the line of frontage of the two other buildings. It was not built on the boundary wall, but close to it. It was absolutely necessary that the Company should get as large a coal storage as possible—certainly up to six weeks' maximum winter consumption. Even with the new buildings, he would not have more than three weeks' storage of the maximum consumption. In the severest weather, it would not more than meet seventeen days' requirements. It was absolutely necessary that this store should be built for carrying on the business of the Company. The coal-store could not be situated anywhere else.

Cross-examined: The storage for coal would be increased by the new building from about 8000 to 9000 tons, or an addition of 1100 tons. Before they made the alteration, there was no other place on the works in which they could store an additional 1100 tons. For several winters past, he had had to put coal in all positions on the works where he could find space for it. Besides, they had to deal with a large quantity of coke; and the area of the works was so limited that it was absolutely essential to reserve more storage for coke. Witness's attention was called to the open spaces on a plan of the works, with the view of showing that storage for coal might have been obtained in other positions; but he maintained that they were required for storage of other material and for traffic. The coal storage, he insisted, could not have been increased in any other position if the business of the Company was to be properly carried on. With physical inconvenience, he might possibly have increased the storage by 150 or 200 tons; but he had only about 50 per cent. of his proper storage now. Even if the Company desired to acquire another site for coal storage, they could not get the land; and, besides, the coal-stores must be alongside the retort-houses. There was no room for the storage of coal on the north side of the road. The land there was used for the storage of bricks, retorts, pipes, and so on. Even if there was room on that side, the coal would not be immediately available for the purpose of gas manufacture. He would not have too much storage if he had accommodation for 15,000 to 18,000 tons of coal. So far as he knew, the West Greenwich works had not sufficient storage. In stress of weather, all the Company's works experienced the same difficulty of getting coal.

Re-examined: The open spaces to which reference had been made were as necessary to carry on the business of the Company as the buildings themselves. The time when they wanted coal most was the time when they were least able to get it. If he was now designing these works, he should not be contented with coal storage of less than 15,000 to 18,000 tons.

Mr. *H. E. Jones*, M.Inst.C.E., the Engineer of the Commercial Gas Company, said the new addition to the coal storage at the Rotherhithe works was imperatively necessary—in fact, they would be in great danger without it. They had carbonized 525 tons of coal a day at this station; so that 9000 tons storage was only equal to seventeen days' consumption. In laying out new works, he should not regard this as sufficient; the rule being that the storage should be equal to six weeks' consumption. The store could not possibly have been erected in any other position. The other spaces, which were small for works of the size of those at Rotherhithe, were required for the ordinary purposes of dealing with coke, breeze, and rubbish, which was constantly being produced on a gas-works. With such limited space, there must at times be great difficulty in carrying on the operations.

Cross-examined: If the Company could get them, larger premises would be desirable. The site of the new coal-store was a convenient and proper place for it. The width of the building, including the original store was some 40 feet. The new portion would be roughly about 21 feet, and the old part 18 feet. If the store had been widened by 16 feet, it would have been an improvement on the old arrangement; but it would have made a difference of about 300 tons in the storage. It was a rule to give 2 acres of land for every million cubic feet of gas produced; but at Rotherhithe they had much less. He did not think they could have found room for the storage of another 300 tons of coal on other parts of the works; and, even if they could, it would have entailed much greater expense and inconvenience. In his opinion, it would be impracticable for the Company to acquire extra land for storage unless it absolutely joined the works.

Lord ROBERT CECIL, in addressing his Worship, said that, even if his friend were successful, the London County Council would not enlarge the street for traffic, because there was a boundary wall there. If he might venture to say so, this was a perfectly futile summons in any case. He had been instructed, on behalf of the Chairman of the Company (Mr. George Livesey), to say that they would be prepared to give up a piece of land on the other side of the street in order to widen it, if necessary. He mentioned this to show that Mr. Livesey was not obstructing a public improvement; but he must protect his Company's rights. The first ground on which his learned friend was not entitled to succeed on this summons was that the Company were exempt from the provisions of the Building Act by section 39 of their Act of 1854, which said, shortly: It shall be lawful for the Company to construct such houses, buildings, and approaches upon the lands belonging to them, or which they may acquire under the powers of this Act, in such manner as they shall think proper. This clearly gave the Company power to construct such buildings on their land as they thought proper—and of this the Company were the best judges—subject to the proviso that the buildings must be reasonably necessary for the purposes of their works. His friend had quoted section 61 of the Act in support of his case; but he did not contend that it deprived the Company of any exemption they might have under the Act. He said that the existence of this section showed that the Company were to be placed in the position of ordinary owners; but, with great respect, he (Lord Robert) maintained that it showed the opposite. But for the existence of section 61, they would be exempt from "lighting, watching, cleansing, paving, or repairing." The Legislature, however, desiring that they should be subject

to these things, put in section 61; but it did not affect the case for building. Therefore, he submitted that the argument to be drawn from the section was the converse to that which his friend had put forward. The real question was whether section 39 was sufficiently wide to exempt the Company from the provisions of the Building Act; and he contended that it was. Having dealt with the cases cited by Mr. Daldy, Lord Robert proceeded to say that, if his Worship was prepared to find that some extension of the coal-store was necessary, and that, commercially, its position was the only one in which it could be put, then the Company were entitled to the decision. It seemed to him to be a question whether this was a case which came within section 13 of part 2 of the Building Act. In this instance, it was a building with a space between it and the highway; and he submitted that so long as the Company did not advance their boundary wall into the highway, they were entitled to build up to the boundary wall, subject, of course, to the rule of the line of building, which it was not suggested they were infringing. It seemed an unreasonable proposition that the Legislature should object to them building on their own ground, when it was merely a question of dealing with the street for traffic purposes. The material point was whether they had narrowed the road by their action; and they had not. Therefore he could not see that the section applied to this case at all.

Mr. DALDY, in the course of his reply, said it was very curious that the Company, being so tight up for room, should be able to offer land on the north side of the street for widening purposes. Regarding the "saving clause" (No. 61) of the Act of 1854, in his opinion it clearly showed that the rights of the Company were to be subject generally to rights such as Vestries would have under Improvement Acts.

His WORSHIP reserved judgment.

Seizure of Gas-Stoves for Debt.

At the Wandsworth County Court on the 7th inst., an interpleader action was heard which raised an interesting point in connection with the above subject. The Chatham Mission Hall, in the Battersea Park Road, of which Mr. Frank Cable was tenant, contained two gas-stoves, belonging to The Gaslight and Coke Company; and a short time ago the contents of the hall were seized for rent by the High Bailiff, acting on behalf of the London, Chatham, and Dover Railway Company, and sold by auction. The Gas Company now claimed the stoves seized, or their value. Mr. Hodges appeared for them; Mr. H. R. Jones represented the High Bailiff; and Mr. M'Claskie attended on behalf of the Railway Company, the execution creditors. From the opening statement, it appeared that the Gas Company supplied the stoves to Mr. Cable for use in the hall. On them were affixed two plates stating that they were the property of the Company; and Counsel contended that for this reason the bailiffs should not have seized and sold them. On the day of the sale, Mr. Cable gave notice that the stoves belonged to the Gas Company; but notwithstanding this they were sold, and fetched only £1 14s., though they cost £9 9s. each. Mr. M'Claskie said he made no claim to the stoves, and a similar statement was made by Mr. Jones. Mr. Cable, who described himself as a house decorator, of Battersea, stated that while he was away in Yorkshire the goods in the hall were seized. Each of the stoves bore the Gas Company's label, and on the day of the sale he gave notice to the officials of the County Court that the stoves were the property of the Gas Company. Counsel for the Railway Company submitted that there was no case against them as they had no notice until after the sale. They were never in possession of the stoves, and never claimed them. His Honour held that the Railway Company were not liable; and he gave judgment for the claimants, with costs of proving the title.

In an action brought by the Gas Company against the Railway Company and the High Bailiff, the evidence given was of a similar nature to that reported above. Mr. Jones contended that his client was not liable for making an honest distraint, which he had done in the present case. George Downton, one of the Court bailiffs, said he seized the stoves, but did not notice upon them a small plate setting forth that they were the property of the Gas Company. Since the sale, he had searched again, and found a small plate at the back of the stove, and away under a pipe. His Honour pointed out that notice was given to Mr. Bradley (his clerk), at the Court, that the stoves were the property of the Gas Company. Mr. Jones contended that Mr. Cable, who gave the notice, was not the owner. Any claims must be given in writing. His Honour held that there was no obligation on the part of the High Bailiff to thoroughly inspect the stoves for the name of the owner; and he was not bound by the information received from Mr. Cable, who was the debtor in the case. It appeared to him that the officer of the Court had used every ordinary and reasonable precaution in the matter. Judgment was given for the High Bailiff, with costs. It was, however, mentioned that the case would probably go to appeal.

Gas Stokers' Wages at Rawmarsh.—On the recommendation of the Gas Committee, the Rawmarsh District Council have granted their head stokers an advance of 2s. a week, and the ordinary stokers 1s. 6d.

Public Lighting of Singapore.—In the circular accompanying the warrants for an interim dividend for the half year ending the 30th of June last, at the rate of 2½ per cent. per annum, free of income-tax, the Directors of the Singapore Gas Company, Limited, inform the shareholders that, though nothing has been settled with regard to the purchase of the Company's works and plant by the Municipality of Singapore, a further contract for public lighting for one year, dating from Jan. 1, 1899, has been made with the Commissioners.

Conveying Plant at the High Wycombe Gas-Works.—The Directors of the High Wycombe Gas Company, Limited, have resolved to lay down, on the suggestion of their Manager and Secretary (Mr. J. Fred Wicks), some coal and coke conveying plant, to facilitate the transmission of coal from the low-level stores and retort-house to the new high-level regenerative retort-house. The plant will consist of tramways, weighing-machine, hydraulic lifts, turn-tables, and direct-acting high-pressure duplex pumping-engine, capable of working up to 500 lbs. per square inch; also specially designed revolving trolleys. The construction and fixing of the plant has been entrusted to the Chester Hydraulic Company, Limited, of London and Chester.

MISCELLANEOUS NEWS.

THE EXPLOSION AT THE SALTLEY GAS-WORKS.

Death of an Injured Workman.

The explosion in the exhauster-house at the Saltley Gas-Works of the Birmingham Corporation on the 13th inst., as reported in the "JOURNAL" last week (p. 1122), has unhappily resulted in the death of one of the two injured workmen—John Watson Smith—which took place in the General Hospital on Wednesday, as the result of shock to the system. An inquest was consequently held last Friday by the City Coroner (Mr. I. Bradley); Mr. S. H. Knyvett, Her Majesty's Inspector of Factories for the district, being in attendance. The Chief Engineer of the station (Mr. H. Hack) and the Superintendent (Mr. J. W. Morrison) were present.

According to the evidence given by Mr. Morrison, he was in bed when the explosion occurred; but hearing the report, he was quickly on the spot. The engine-room was then enveloped in flames. With assistance he got the hose out, and a supply of water was soon brought to bear on the fire. One engine was "running away" owing to the increased pressure. Witness got into the building, and with great difficulty succeeded in bringing it to a standstill. The place was full of steam, and he could scarcely see. He burnt his right hand badly by shutting one valve, which was red hot. He also turned off the supply of gas. The Fire Brigade were quickly in attendance, and the flames were got under. Mr. Morrison produced two broken plates off the cylinder through which the gas escaped. One was simply a plain plate, bearing the name of the maker of the engine, and the other was part of the cylinder cover. Both were ¾ inch thick, and the metal was perfect. The cylinder was 3 ft. 8 in. in diameter, and there was a pressure of 1 lb. per square inch. Witness said he knew that the men had been in the habit of "propping" the engines with pieces of timber in a certain position when they stopped them, in order that the weight of the exhaust cylinder would re-start the engine when required without anyone pulling on the fly-wheel. One piece of wood was placed in a horizontal position on the top of the cylinder (a vertical one), and another piece was fixed in a perpendicular position—one end resting on the former piece and the other against a projecting part of the machinery against the piston-rod. The system was introduced by the men themselves, and had only been in vogue a few months. If the piece of wood in the horizontal position went right across the cylinder, so that the pressure was borne by the sides and not merely the cover, witness had no objection to the practice. The piece of wood generally used for the purpose (a big piece) could not be found after the explosion; and witness was afraid the deceased did not use it. Two small pieces were discovered in the cylinder. As one of these was generally used as the perpendicular prop, witness concluded that deceased had only used these two bits. The piece thus placed in the horizontal position would not reach across the cylinder, and the pressure when the piston-rod descended was too much for the cover—the wood being forced straight through it. The gas then rushed out and exploded.

Evidence was given (including depositions by Gilbey, the other injured man) showing that deceased had evidently tried to bring the engine to a standstill without any assistance, as he was alone in the exhauster-house when the cylinder broke. Gilbey heard the crack, and, rushing in, found deceased trying to shut off one valve. Deceased told him to turn off the other, and he was doing so when the explosion occurred. Both men were shockingly burnt; but they managed to run out into the yard. They were attended to very promptly; but it was stated that the ambulance dressings used were brought by the police. Mr. Morrison said dressings were kept in various parts of the works, some being very near to where the explosion occurred. Both men were taken to the General Hospital; and Gilbey was progressing fairly well, but not quite so satisfactorily as could be wished.

In summing up, the Coroner said it was worthy of consideration on the part of the management whether some better information could not be posted up throughout the gas-works, showing the exact spots where ambulance dressings could be obtained. He thought the only verdict the Jury could bring in was one of "Accidental Death." The Jury did so; and added a rider to the effect that they considered the practice adopted by the men highly improper, and hoped that if the Authorities had not already put a stop to it, they would do so at once. Mr. Knyvett said that in the course of his duties he frequently had illustrations of the terrible results of the loss of presence of mind after an accident. During the sixteen years he had been in his present position, he had never come across an instance of greater presence of mind than that shown on this occasion by Mr. Morrison, who, in the face of extreme danger, rushed into the building, stopped the engine, and turned off the valves. Mr. Hack expressed the great regret felt by the Gas Committee at the result of the accident, and said he had no doubt they would do what they could for the poor widow. The suggestions with respect to the ambulance stations would be carefully carried out.

CAMBRIDGE GASLIGHT COMPANY.

Mr. Peed's Defalcations—Settlement of the Claims.

An Extraordinary Meeting of the Cambridge Gaslight Company was held on Monday of last week—Mr. E. H. PARKER presiding—for the purpose of submitting to the shareholders proposed terms for the settlement of claims made against the Company under alleged mortgages and stock certificates fraudulently issued by the late Secretary (Mr. Peed).

The CHAIRMAN said, in pursuance of the policy declared at the last meeting of shareholders, the Board had negotiated with the defrauded mortgagees and shareholders; and they were now unanimously prepared to recommend the shareholders to sanction a compromise. It would be in their recollection that there were three forged mortgages—one for £1800, another for £2000, and the third for £1300; making in all £5100. There were also forged certificates—one for £800 original stock, which had a market value of £250 per cent., equal to £2000, and

for consolidated stock for £1060, which, taken at the market price, equalled £1855. The Company had also been directly robbed by the late Secretary of £4500. So they had total liabilities through his defalcations amounting to £13,455. The Evans mortgage, of which they were directly robbed by the late Secretary, had been settled at once with £4500. This left them to deal with the other forged mortgages and certificates. He did not know whether "forged" was exactly the word to use; they were fraudulently issued, which was, perhaps, the better expression. They were now prepared to ask the shareholders to sanction a compromise of the forged mortgages for the sum of £1700; being one-third of the principal money purported to be secured by the mortgages, with interest at 3½ per cent. per annum upon that sum. This meant £1780 to get rid of the liability. With regard to the certificates, they recommended that, in the case of the £800 original stock, the holder of the certificate should be paid one and three-sevenths of the face value; and with regard to the 7 per cent. consolidated stock, that the face value be paid. They were obliged to offer a good deal to compromise the claim for £800 of original stock, because the stockholder had been on the register for two years; and it was doubtful whether the claim could be legally contested. The result of the whole thing would be that they would have to pay the sum of £3982 15s., *plus* costs as between solicitor and client, whatever they might come out at. He did not think they would reach £100 They might take it, then, that the compromise would cost the Company £4000. The Directors had very carefully considered the matter; and one and all had thought it right, expedient, and politic to compromise the matter. The Company were £8500 poorer; but the Directors hoped to be able to continue to pay the maximum dividend. He might say every effort was being made to increase the business of the Company. They had turned their attention very seriously to heating and cooking stoves; and they had introduced the prepayment system during last month, with very satisfactory results. Since Oct. 1 they had sent out 82 cookers and 97 heating-stoves, besides 175 slot meters for stoves and lighting. Not long ago, there were only 300 gas-stoves in existence in Cambridge; but since Oct. 1 they had sent out 329 on the two systems. The Chairman concluded by formally proposing a resolution, authorizing the Directors to settle the claims in the manner stated.

Mr. Barron (an ordinary shareholder) seconded the motion.

The Chairman, in reply to a question, said the Directors had negotiated with the people who lost money; and they were all willing to accept the terms named.

Mr. Matthews said this involved a curious question in law, which had not been settled. Take the case of the Great Northern Railway Company, who were so fearfully robbed, and also of The Gaslight and Coke Company, the Directors met the innocent sufferers not like criminals, but as respectable people; and in due course they paid them their stock certificates in full.

The Chairman: That, I am afraid, is impossible here. The Company are not strong enough to do it.

Mr. Matthews said he understood the certificates of the transfers were not forgeries; they were simply bogus certificates, signed by the Chairman and sealed. Could the Chairman tell him of any Company in Great Britain where certificates signed by the Chairman and Directors were not binding?

The Chairman was afraid he could not answer the question with regard to any particular company; but they had had the advice of different Counsel they had consulted on the subject. If they had fought the case, they would have had to go to the House of Lords, and that was one reason he thought it important to settle by compromise.

Mr. Matthews considered the Directors had acted legally, most business-like, and gentlemanly. Still, he for one would like to see the question fought out in the House of Lords, and the point as to what was a stock certificate settled once for all.

The motion was unanimously agreed to.

The Chairman, in acknowledging a vote of thanks, said the Directors thanked the shareholders for the way they had co-operated with them in this matter. It was a very unpleasant affair; but he thought they had now heard the last of it.

ORIENTAL GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held on Wednesday last at the Offices, Finsbury House, Blomfield Street, E.C.—Mr. J. Blacket Gill, Chairman of the Board, presiding.

The Secretary (Mr. H. J. Luff) read the notice calling the meeting; and the report and statement of accounts were taken as read.

The Chairman said he did not think he need detain the shareholders very long that morning, and what he had to say would be mostly of a congratulatory nature. He thought they would all agree with him that the statement of accounts presented on that occasion was, in every sense of the term, very satisfactory. First and foremost, they would notice that the loans on debentures, according to the balance-sheet, had been reduced to £1950; but he had better news than this, because since the date of the balance-sheet they had been enabled to pay that off, so that the Company were now entirely free from debenture debt. They must all be very pleased at that. When they reflected that ten years ago they owed £44,120, and previously considerably more than this, they had good cause to congratulate themselves on the complete extinction of the debt, especially as during the whole of that time they had enjoyed good dividends. The exchange, as they were aware, was a very important figure in their accounts, and he supposed it would be so to the end of the chapter. This year, however, it had been somewhat more favourable than in the previous twelve months. As they were aware, a Committee of the House of Lords was now sitting upon this very ticklish question; and, as the Board were uncertain respecting the future course of exchange, they had considered it right to put £3500 to the exchange equalization account, which would, no doubt, serve them in time of need. It was not for him to pass any opinion upon the exchange question; but, of course, the keeping up of the value of the rupee in Calcutta had tended to improve their accounts this year. Whether it was wise or not, it was not for him to say. It would be noticed by the accounts that, in the price of coals, they had saved something like £268; while at the same time they had the very satisfactory increase of £2284 in rental. Coke and tar showed an increase of £896. These were not large amounts, but still were on the right side. The new consumers for the year numbered 157; and they had about 689 additional lights. Unfortunately, the plague paid them a visit, though he was glad to say, from the last official return he read, that Calcutta was now declared to be free from it. It gave their Manager, Mr. Niven, some trouble, as the men were inclined to leave their work; but he seemed to have such good control of the men that he soon got over the difficulty. The Board had concluded an arrangement with the Commissioners of Howrah to light some of the streets there with incandescent burners for 14 years. The terms were settled some time since, and the Board wired over some months ago thinking that the Commissioners might be in a hurry; but although the terms had been all arranged, the Directors had not yet had the contract before them. He did not think there was any need for apprehension on this score. The fact was, it had to be submitted to the Government Department; and the gentlemen there seemed to take very long holidays. Indeed, he was often reminded of the Eastern proverb, that nothing was so marvellous as to-morrow. It seemed to be a cardinal principle at Calcutta that whatever could be done to-morrow should not be done to-day. As they knew, the Company's contract with the Municipality of Calcutta terminated in 1901. He had nothing definite to say about the matter, except that the Board had entered into correspondence with the Municipality, and expressed themselves desirous of continuing on the present amicable terms for a further period. They had had no direct response to this reply yet; but there was every reason to hope that they would come to terms with the Municipality. There was no reason why they should not. The Board were anxious to light Calcutta with the Welsbach burner, of which this Company were agents for Bengal; and there was no reason why Calcutta should not be a well lighted city, if proper arrangements were come to. He was very much struck during a visit to Dresden, only a week or two ago, by what he saw of the lighting of the place. There they had the arc electric light and the Welsbach burner, about half and half; and no unbiassed person could possibly fail to see that the light given by the latter was by far the superior of the two. He therefore could not see any reason, that being so, why they should not be able to agree with the Municipality of Calcutta to improve the lighting of the city on mutually satisfactory terms. Their Manager reported that the works were now in good condition; and he might add that they had recently sent out a new washer—a somewhat expensive instrument. They wanted to see if they could not do some business in sulphate of ammonia. It had never been attempted hitherto, but the Board wished to see if they could not develop a profitable trade in it there. Another little matter he thought they would be pleased to hear was that the Board had started a reserve fund. It did not appear in the accounts, because it had only been started within the last week or two. The Directors had bought £6000 of a gilt-edged security—Birmingham Corporation stock—to commence the fund, which might help them in the future if ever the proverbial rainy day should come upon them. It had been a matter of great regret to the Board that such a fund was not started many years ago. The Company would have been in a better position to-day if it had been. Now that they had a chance of starting such a fund, the Directors thought they should lose no time in doing so; and he believed the shareholders would agree with them that they could not take any step which would be more conducive to the best interests of the Company. He concluded by moving the adoption of the report and statement of accounts as submitted to the meeting.

Mr. Robert Hesketh Jones, in seconding the motion, said with reference to the renewal of the contract with the Municipality of Calcutta for public lighting, the shareholders should understand that it was not the same kind of thing as the renewal of a concession on the Continent. Assuming they lost their contract with the Municipality, they would still retain the private lighting of the city, although that was a somewhat small item in Calcutta. The only disappointing feature in the accounts was the item for meters, fittings, and services. The Chairman had alluded to the fact that they had taken over the agency for the Welsbach burners, and consequent on this they had been put to a good deal of expense, which, it was hoped, would not occur again. In taking over the stock, and fixing some of these burners for public lighting, they had necessarily been put to some small loss.

Mr. Spencer remarked that everything likely to be said on the shareholders' side of the table could not fail to be of a laudatory character with regard to the attention given to the business. He wished to ask for some explanation with reference to the purchase of coal, which, as stated in the report, had resulted in a reduction in the cost of the quantity carbonized. Was he to understand that they had been using a superior kind of coal to that formerly used; and, if so, what was the difference in price? Then with regard to his allusion to Dresden, it would be interesting if the Chairman had a comparative statement as to the cost of the two kinds of lighting—the arc electric and the Welsbach.

The Chairman replied that he had not. He was merely on a visit to Dresden for pleasure; and from what he saw of the lighting of the town, it struck him that the Welsbach burner was very superior to the arc light. No doubt it was very much cheaper as well as better. As to their coals, he should say that their contracts ran on for another six months. They were using the same coal as before.

The report was then agreed to.

On the motion of the Chairman, seconded by Mr. H. D. Ellis, a resolution was passed approving of a dividend of 8 per cent. for the twelve months ended June 30 last, the same to be paid on the 15th prox., less the 3½ per cent. paid on June 4.

The retiring Directors and the Auditors having been re-elected, the proceedings closed with the usual votes of thanks.

The Lighting of London Parks.—Last Wednesday, Colonel Wheatley, R.E., Ranger of Home Parks under the Government Office of Works, and Mr. G. F. L. Foulger, the Distributing Engineer of The Gaslight and Coke Company, visited Liverpool for the purpose of inspecting the street lighting, principally in connection with the incandescent gas system. It is understood that they are preparing a report on the lighting of the London parks. The visitors were accompanied in their tour of inspection by Mr. C. Petrie, Chairman of the Lighting Committee of the Corporation, and Mr. C. R. Bellamy, Superintendent of Street Lighting, who gave them much useful information.

THE CARBURETTED WATER-GAS QUESTION AT FALMOUTH.

It may be remembered that in the course of the report presented to the Corporation of Falmouth by Mr. A. Silverthorne, on the gas and water works purchase question, a summary of which appeared in the "JOURNAL" for the 25th ult., he expressed the opinion that the supply of water gas by the Gas Company was most undesirable. This adverse opinion was expressed in such strong terms that it gave rise to some discussion in the local papers; one of them giving a special article on the subject. Before noticing this, it will be well to reproduce the portion of Mr. Silverthorne's report dealing with this matter. It is as follows:—

The supply of water gas in a locality like Falmouth upon any proportion is most undesirable, as the poisonous qualities of carbonic oxide gas, even when diluted, are well known. Under no circumstances should I advise the Corporation to continue the supply of water gas, which, unfortunately, they are powerless to prevent directly the plant is complete. This water-gas plant is designed to produce 150,000 cubic feet per 24 hours. This was actually the mid-winter production of ordinary coal gas per 24 hours in 1895; and it will be useless to endeavour to convince the ratepayers that the object of this plant is merely to enrich gas. I assert positively that the purpose of it is to furnish a mixed supply of coal gas and carbonic oxide. These water-gas plants in London have occasionally been erected and kept in reserve as a menace to labour on account of the rapidity with which they can be brought into operation. They are also advocated on the grounds that they can supersede manual labour to the extent of 70 per cent., and that, by finding a new outlet for coke, they enable the Company to secure a higher price for this article in the locality from coke consumers.

Reverting to the article, the writer, after describing the process of making carburetted water gas, went on to say that in the Garston district of the Liverpool United Gas Company its manufacture had "aroused considerable feeling, as some fatalities were traced to its introduction." Birkenhead, Blackburn, Manchester, and Southport were cited as places where it had been used "in proportions varying from 50 to 95 per cent." The writer urged that there was little doubt of the gas being "dangerous to life in these proportions"; and he went on to say that though consideration of this fact was not allowed to have much weight in America, so long as money could be had out of it, it might be worth considering whether the Corporation of Falmouth, in the event of their succeeding in the purchase scheme, "would tolerate for one moment the introduction of a gas which, by reason of its nefarious reputation, was likely to keep visitors away from the town." He added that the Corporation were powerless to prevent the introduction of this gas, in whatever proportion; but he was given to understand that, in the event of the purchase scheme being sanctioned, they would be advised not to use the plant under any circumstances.

To the statements in this article the Gas Company's Engineer and Manager (Mr. J. W. Buckley) promptly replied. He said its object was obvious; but his Directors had come to the conclusion that the writer knew little, if anything, of the subject he had dealt with. As he had not attached his name to the article, the inference they drew was that he was afraid to do so lest he should prove the justness of their conclusion. Mr. Buckley pointed out that carburetted water gas is being made at about sixty gas-works in Great Britain, including those belonging to the Corporations of Belfast, Birkenhead, Birmingham, Blackburn, Edinburgh, Halifax, Manchester, Middlesbrough, Southport, Stockport, and Stockton-on-Tees—one of the towns named being a health and pleasure resort; while at Scarborough an important addition was being made to the works in the shape of water-gas plant. He urged that there was wisdom in the Councils of these important boroughs; and he pointed out that, with the able scientific advisers they possess, the matter had received most careful attention. He quoted from the address of Mr. Stelfox at the meeting of The Gas Institute in Belfast last June to show that, in this gentleman's opinion, carburetted water gas had been "the greatest and most successful departure from old methods of gas making that has characterized the last decade of the century." He further cited Mr. Stelfox to emphasize the fact that if people will blow out their gas, or prefer to turn on their taps before finally retiring to rest, the vendors of a useful commodity, supplied for external use only, are surely not to be blamed for such negligence. He added that carburetted water gas—which, he pointed out, was a totally different thing from water gas—had "come to stay;" and that, after visiting many of the most important installations of plant in this country, he had not the slightest hesitation in recommending its adoption to his Directors.

The writer of the article replied to Mr. Buckley. He said his point was that carburetted water gas was dangerous to life, if inadvertently inhaled in the proportion in which it was supplied; and particular attention was drawn to the significant fact that the plant for its production at Falmouth was on a scale approximating to the mid-winter daily make of ordinary gas. He cited the following passage from Professor Lewes's report to the Birkenhead Corporation: "Carbon monoxide is the most dangerous gaseous poison there is; and the attempts made by some supporters of carburetted water gas to gloss over this fault are as mistaken as they are mischievous;" and went on to say that it was quite impossible to accept the views of interested persons on this point, for with even the limit which the Professor thought must not be exceeded—viz., 17 per cent. of carbon monoxide—which should, on a proper mixture, yield a limit of 50 per cent. of the water gas, fatalities were constantly occurring. He therefore thought it was impossible to conceive a more dangerous course than to introduce water gas into Falmouth, as it would keep away visitors—and it would do so likewise at Scarborough—directly it was known, and would in other ways be injurious to gas interests.

Mr. Buckley replied to this article by quoting the following sentences from Professor Lewes's report: "That there is no danger in sending out as a town supply a mixture of 50 per cent. of carburetted water gas. That mixtures containing 50 per cent. and under of carburetted water gas are, for all practical purposes, as good as cannel and coal gas; while for use in incandescent mantle lighting they are superior." He also brought forward the testimony of Professor Crum Brown, as contained in his report to the Gas Commissioners of the Edinburgh and Leith Corporations, to the effect that "the increased amount of carbonic oxide is no real objection to the introduction of carburetted water gas for illuminating purposes in place of coal gas." He further pointed out that in many of the most important health resorts in this country—viz., Bath, Bexhill, Brighton, Folkestone, and Hastings—water-gas plant is in use. Dealing with Mr. Silverthorne's report, Mr. Buckley said he thought that gentleman was displaying exceedingly bad taste in posing, with his limited experience, as an authority on the subject of water-gas plants. It would, he said, be interesting to know what plants, if any, the author of the report had seen before he inspected the one at Falmouth. Mr. Silverthorne might consider he was doing a fine thing by his attempt to handle this matter; but he (Mr. Buckley) knew that, as a matter of fact, he was defeating his object. His own advice to the Corporation, as an engineer, as a ratepayer, and as a consumer, was to make the best possible use of the plant, supposing the purchase schemes were successful. After offering some explanatory observations on the recent case of suffocation at Belfast, Mr. Buckley closed his letter by asserting that no evidence could be brought forward to prove that in any single case of suffocation in Great Britain, from a town supply, it could be traced to the admixture of carburetted water gas with coal gas. To talk about keeping visitors away was, he said, ridiculous in the extreme.

The subject was taken up by a visitor to the town, who had been much amused at the attempts of the writer of the article above alluded to and Mr. Silverthorne to "create a panic over the introduction of carburetted water gas." He pointed out that if there were any basis for Mr. Silverthorne's scare, the largest cities in the kingdom would not be found supplying carburetted water gas in ever-increasing quantities, while the larger towns were following suit with all possible rapidity. He thought it was evident the object was to depreciate the value of the gas-works; but he considered it was a pity that, in attempting to accomplish it, the reporter should have displayed his ignorance of the process he so fiercely slandered. "Visitor" thought that, after all, the final word rests with the Board of Trade, who are investigating this subject, and in whose hands the safety of the public health was well secured.

The writer of the article above noticed returned to the subject in a letter published on the 5th inst.; the principal point dealt with being the alleged danger attending the supply of water gas. He said he believed it could be shown that gas companies have no statutory authority for supplying "mixed gas with unusual toxic properties;" and he ventured to assert that Mr. Buckley and his Directors would "stand absolutely alone in defence of this surreptitious step." He went on to say: "Not a single voice will be raised by consumers to support the introduction of the death-dealing carbon monoxide, in whatever degree, but still capable of suffocating its victims in the night-time for no greater omission than not turning a tap properly off. No one would be killed by an ordinary escape of coal gas; but resuscitation from carbon monoxide poisoning seems out of the question, according to the authority of medical experts. It is upon this grave aspect of the question that the introduction of this gas will be judged and, I expect, condemned by public opinion. Already in Falmouth there are many consumers declaring openly that if coal gas is in future to be supplied mixed with carbon monoxide, they will banish gas from their houses."

In his reply to this letter, Mr. Buckley characterized the last statement as all "bluff;" not a single consumer having raised a voice in such terms at head-quarters, though many of them believed the new gas had been supplied for months. To upset some of the theories advanced by the writer of the article, Mr. Buckley cited again the case of Birkenhead, and Professor Lewes's report to the Corporation to the effect that "there is no danger in sending out as a town supply a mixture of coal and cannel gas with carburetted water gas, provided the carbon monoxide in the mixture does not exceed 17 per cent., which with the two gases as at present made would give a limit of 50 per cent. of water gas." He quoted the opinion of the Special Sub-Committee of the Corporation, as given in the "JOURNAL" for the 3rd of May last, that if the mixture of coal and water gas were distributed with the same care and attention to pipes and fittings as had been bestowed in the past, there could be "no reasonable or valid objection to the supply of the mixed gases." He went on to show, by another quotation from the "JOURNAL," that uncarburetted water gas was to be used for incandescent lighting at the General Hospital in Vienna, accommodating about 3000 persons. He urged that a mixture of carburetted water gas is better fitted for use with incandescent mantles, as it requires a slightly lower proportion of air for complete combustion, and there is certainly less liability to blacking the mantle. He contended that the manufacture of water gas not only gives satisfactory results to the producers, but also yields to the consumer a better, brighter, and purer light. He quoted Sir E. Frankland to the effect that water gas can be "used with safety both in public buildings and private houses." With regard to the much-talked-of carbon monoxide, Mr. Buckley said: "Dr. John Haldane has given us the only data of practical value on the effects of carbon monoxide on life. He found that 0·05 per cent. (1 in 2000) of it in air begins to have an appreciable effect, but can be inhaled for four hours without any marked symptoms. It is possible to breathe air containing 0·1 per cent. for a considerable period without danger; but it must be remembered that both coal gas and carburetted water gas contain hydrocarbons, the toxic action of which is but little understood. For all practical purposes, 0·05 (1 in 2000) may be taken as the margin of safety. I will endeavour to show that under ordinary circumstances, *with proper ventilation*, it is almost impossible for death to occur even in a small room with the gas-tap full on. For instance, take a small bedroom 12 ft. by 12 ft. by 7 ft., equal to 1008 cubic feet of air space. This room contains a fireplace, a door, and a window. The two latter being closed, and no fire in the grate, the whole of the air in the room is probably changed at least twice in an hour. If gas escapes into a room of the above capacity at the rate of 6 cubic feet per hour, while the air of the room is changed twice in the hour, then after three to four hours the percentage of gas will rise to 0·3, and the rate of leakage and removal by the changing air will become constant; and the percentage of the gas will not rise above that point, however long the leakage may continue. It has been shown above that 0·05 per cent. of carbon monoxide may be inhaled for four hours without dangerous symptoms; and this amount will be present if it constitutes one-sixth, or 16·6 per cent. of the gas escaping in the room." In view of the decision in the Plymouth case, reported in the "JOURNAL" last week, Mr. Buckley added a few remarks with reference to that unfortunate occurrence, which has been seized upon by several papers in the West of England as an instance of the danger attending the use of water gas. He referred to a fact not generally known—that gas consumed in Scotland, made from coal alone, contains as much as 10 to 11 per cent. of carbon monoxide; and he

pointed out that many towns are supplied with an admixture of carburetted water gas and coal gas in which the constituent in question does not exceed the percentage above mentioned. He thought Mr. Silverthorne would do well to ponder over this fact. Mr. Buckley closed his letter with the remark that the discussion was more suitable for a scientific publication than an ordinary newspaper; and he invited the anonymous writer of the article, if he was desirous of benefiting the gas consumers of the country, to read a paper before The Gas Institute, the Institution of Gas Engineers, or the Institution of Civil Engineers, at any of which places he (Mr. Buckley) and many others would be glad to meet him.

NEWBURY CORPORATION GAS UNDERTAKING.

The Manager's Resignation.

In the "JOURNAL" last week, it was mentioned that Mr. R. M. Couper, the Gas Manager to the Newbury Corporation, had tendered his resignation of this position, which he has held for about seventeen years. The reason for this step came out at the meeting of the Corporation on the 15th inst., when some correspondence which had passed between Mr. Couper and one of the consumers appeared, at the request of the former, upon the minutes presented by the Gas Committee. It appears that some fitting work was done for the consumer at the cost of 7s. 4d., which had not been paid. When he sent a cheque in payment of his gas bill, deducting the usual discount, it was returned to him by the Manager with an explanatory note to the effect that, as the 7s. 4d. was still outstanding, he could not accept it; the practice being not to allow discounts to consumers in arrear. The consumer replied that the fitting work did not relate to the premises for which he was paying for the gas. He therefore sent back the cheque, and said if it was again returned he should bring the matter before the Committee. The Committee decided that inasmuch as the sum in question had not been added to the account sent in, the discount should be allowed. There was a further squabble with this consumer about the rent demanded of him for a slot-meter. The Manager was charged with "high-handed conduct" in this matter, though he had only carried out the instructions of his Committee; and the affair culminated in Mr. Couper sending in his resignation on the 3rd inst. It was addressed to the Mayor, Aldermen, and Burgesses, through the Town Clerk (Mr. F. Q. Louch), and was in the following terms: "Gentlemen,—The best years of my life have been given to rescuing your gas-works from a condition bordering on complete collapse, and placing them on a footing equal to the best of small works anywhere. The position in 1898, as compared with 1881, ere I took charge, is in short as follows: Business doubled, working expenses just the same, price of gas 29 per cent. less. Yet my salary as Manager has been kept down to merely 14 per cent. more than my predecessor had. There is no incentive to zeal and renewed effort in this treatment, which is wretched; and it has lately become quite apparent that only by forfeiting my self-respect could I continue holding my position—a position where duty done regardless of fear or favour is an impossible thing without suffering some penalty. I have suffered. For some time past a 'hounding-out' process has been in operation against me—for example, the one-sided, unjust, and cowardly attack made upon me at the last Council meeting. All this is hateful; and it therefore affords me pleasure to say that on this date three months hence, I shall quit your service. To those members of the Council who have judged my management on its merits I beg to offer the expression of my deepest gratitude." At their meeting on the 7th inst., the Gas Committee decided that there should be no separate meter-rent charged for slot-meters, but that the price charged for the gas supplied through these meters should cover the rent.

On the consideration of the minutes, Mr. Jackson moved that the Manager's resignation be accepted; and this was seconded by Mr. Hanington. Mr. Midwinter said he for one did not intend this incident to pass without expressing his regret that they were losing Mr. Couper. The gas-works had been placed on a sound footing, and investigations of a technical character had confirmed his work, while the Gas Committee had reported satisfactorily of his management. Alderman Hopson said he felt genuine regret at the occurrence, and it would be in accordance with his feelings if the Manager were asked to reconsider his decision. Mr. Lucas said the correspondence before them showed the obstinacy of the consumer—an obstinacy which ought never to have been allowed. He supported the Manager in not keeping the cheque under the circumstances. Mr. Rankin eulogized Mr. Couper for his successful management of the gas undertaking, and expressed the opinion that, as the resignation had been brought about by a quarrel in which the Manager had followed the direct instructions of the Committee, the matter should be reconsidered. He moved an amendment to this effect, and it was seconded by Alderman Hopson. Mr. Hanington said he should be quite willing to add to the motion an expression of regret, and appreciation of the Manager's services. Mr. Jackson said he had only moved the acceptance of the resignation as a matter of business, and knowing that, having been sent in, it would be adhered to. If he had been in the Manager's place, he should have sent a similar letter; and after such a letter reconsideration was impossible. He should be glad to move—"That the resignation of the Manager be accepted with regret, and that the Council desire to express their sense of the able and conscientious manner in which he has discharged the duties of his office during the seventeen years of his management." Mr. Harris said he had seen a good deal of Mr. Couper during the last seven years, and could not omit to add his appreciation of the services rendered. On many occasions he had stood up for Mr. Couper when he was unjustly and unfairly criticized. The Manager had had seventeen years of uphill work, and had discharged his duties in a most satisfactory manner. Mr. Midwinter was glad to find such an expression of opinion from the Council, and only wished that it could have come from the Gas Committee in the first place. They were doing Mr. Couper a simple act of justice in putting this on the minutes. The correspondence was so trumpery that it should make them blush to think that such a matter had been brought before them. Mr. Smith (the Chairman of the Gas Committee) claimed for the Committee a share of the credit for having brought the gas undertaking to its present condition. Mr. Jackson's resolution was then carried unanimously.

At their meeting on the 10th inst., the Gas Committee discussed the appointment of a Manager, and recommended that it should be upon the following terms: Salary, £200 per annum, with gas for lighting purposes free; the new Manager to commence his duties on the 16th of January next, and the engagement to be determinable by three calendar months' notice on either side. Mr. Smith, in moving the adoption of this recommendation, said he personally did not think it wise to tack anything on, and not be included in the salary. Alderman Hall agreed that £200 should be the salary, and nothing be said about free gas. Mr. Elliott expressed the opinion that the terms would give rise to opportunities of bickering, and it would be difficult to draw the line between lighting, heating, and cooking gas. They would put the new Manager in the difficult position of recommending gas for cooking purposes, and not being able to use it for this purpose himself. He moved an amendment that the £200 salary should be inclusive; and this was adopted.

THE BRADFORD CORPORATION AND OUTLYING GAS UNDERTAKINGS.

A Special Meeting of the Bradford City Council was held last Wednesday to determine whether steps should be taken to promote a Bill in Parliament in the ensuing session for several important purposes, among which is the purchase of the undertakings of certain Gas Companies who possess the right to supply gas to the inhabitants of Allerton, Thornbury, Tyersal, Heaton, and Frizinghall. In moving a resolution agreeing to the promotion of a Bill, Alderman H. B. Ratcliffe sketched the proposals contained in the measure. Regarding the gas portion, he said it provided for the purchase of the undertakings of the Clayton, Allerton, and Thornton Gas Company, the Pudsey Gas Company, and the Shipley Gas Company. The proposal was that these undertakings should be acquired at such a price as might be agreed upon, either by mutual arrangement or, in the event of that failing, by recourse to arbitration. When this had been done, the Corporation could abolish the anomaly which now existed whereby consumers in some portions of the city were paying 20 or 25 per cent. more for their gas than was paid by them in other parts. Alderman Wood seconded the motion. Mr. Peel inquired why Tong was not mentioned in the Bill in connection with the proposed purchase. Mr. Williamson asked if it was proposed to apply for powers to buy the whole of the Pudsey Gas Company's undertaking, or only the portion relating to Tyersal. The Town Clerk: Only the portion relative to Pudsey. As to Mr. Peel's question, he added that the Bill did not provide for the purchase of the Drighlington gas undertaking, because no order had yet been issued that Tong should become part of the city. Directly the extension scheme was sanctioned—and they were sure to have an extension scheme of some kind sanctioned—it would be necessary for the Council to go to Parliament for powers to deal with the other Gas Companies. The motion was adopted.

ELECTRIC LIGHTING NOTES.

The Manchester City Council have decided, on the advice of the Electric Supply Committee, to abolish the charge for electricity meters as from March 25 next.

Even the modified scheme of electric lighting proposed by the Bury St. Edmund's Town Council does not commend itself to a section of the ratepayers. A private meeting of the latter was held last Tuesday, when it was decided to offer an emphatic protest against the proposal to borrow £16,000, which the scheme is estimated to cost.

A public inquiry was held last Thursday at Burnley into an application by the Town Council to borrow £10,000 for electric lighting purposes. It was stated that the works had been profitable from the start; yielding a surplus of £500 a year. A sum of £25,000 is already being spent in extending the works; and now £10,000 is needed for new mains.

The Stretford District Council are not yet to be turned from their intention to carry out a scheme of electric lighting of their own rather than allow the Manchester Corporation to supply current at the same price as is charged to the citizens. No doubt for the purpose of showing that they are right and the opposing ratepayers wrong, the District Council last Tuesday decided to engage Mr. R. P. Wilson to advise them upon the various schemes proposed; and his report is to be printed and distributed for the information of the ratepayers.

Complaints continue to appear of the erratic behaviour of the electric light at Exeter. A correspondent of one of the local papers says that on a recent evening the light was playing tricks in the houses of private consumers. "The following night," he continues, "it shared its vagaries between public and private customers. People at dinner eventually found themselves in darkness. And in the main streets of the city things were all awry." Similar complaining has been heard many times since the Corporation took over the supply of electricity. The newspaper's comment on this one is that the Town Council must make the supply more satisfactory, or they will lose all their customers.

Notwithstanding the action of the District Council, the Walker and Wallsend Union Gas Company are persisting in their proposal to apply to Parliament in the ensuing session for power to supply the electric light within their area of gas supply. This area embraces Wallsend, Willington Quay, Willington, Howdon, and Walker. The Company intend to erect adequate works for the purpose, and seek comprehensive powers for the distribution of the electric energy. They are asking for powers to increase their capital for the purposes of the new undertaking, and to enter into agreements with local authorities either to supply the electrical energy to them, or to sell or transfer their undertaking.

The Dublin "Freeman's Journal" last Wednesday contained the following paragraph: "All last night and this morning, the thoroughfares which depend upon the electric system for illumination were in a state of semi-darkness. One side of each of the streets in this area was without light—the usual light—and presented, in consequence, a very gloomy appearance. This is not by any means the first time this year that partial darkness has resulted from similar causes in the principal streets of Dublin." On the following day, it was explained that this partial failure was due to the fact that the old cables are pretty well worn; and that, having done full duty for a number of years past, they are now being replaced by new ones. The work will not be completed for nine months

to come; and during that time occasional decreases in the normal quantity of light may be anticipated. Care, however, has been taken that none of the streets served by the electric system shall ever be left entirely without light.

For two years the ratepayers of Colwyn Bay have been exercised over the question of electric lighting. The District Council have a Provisional Order, and they have even purchased a small quantity of electrical plant, which has since been lying idle; but the inhabitants view the expense of erecting works with some alarm. In order to arrive at a decision on the matter, a public meeting was held last Thursday; and the proceedings were of a very lively character. Mr. Bevan, a member of the Council, moved—"That this meeting is of opinion that the erection of electric lighting works at the ratepayers' expense will lead to a heavy addition to the rates for some years, and suggests that the Council should make terms with a private company to carry out the Order, or wait a few years until a reduction in the rates shall have made it possible for them to do it themselves. Meanwhile, in order to better light the main roads, additional incandescent gas-lamps should be provided where required." After a long discussion, during which some uproarious scenes occurred, a show of hands was taken, 52 voting in favour of the scheme, and 56 against. The Rev. Thomas Parry thereupon proposed that the electrical plant already purchased should be utilized for lighting the streets in the centre of the town. This was carried by a large majority.

Last Thursday, the Hampstead Vestry decided to borrow £10,490 for electric lighting purposes, on the conditions contained in a letter from the Assistant-Solicitor of the London County Council. This letter stated that, subject to the necessary consents, &c., the Council were prepared to provide this sum, in addition to the £39,980 already advanced, as further part of the loan of £51,500 applied for, for the extension of plant at the electric lighting station, to be repaid by equal annual instalments, within 42 years; interest at 3 per cent. being payable quarterly. It was asked if the Vestry would take up the loan on these terms. As the Vestry had elected to spread the repayment of the whole of the initial cost of the installation over 42 years, the Council would decline to sanction the raising of any loan to replace any of the plant and machinery to be provided with the proceeds of the present loan during the currency of the loan, and would expect the Vestry to provide for all replacements and renewals required during that period out of a sinking fund to be formed for the purpose or from the maintenance account; and they requested to be furnished with a copy of the resolution of the Vestry accepting and recording the condition on which the Council allow so long a period as 42 years for the repayment of the loan. Another communication was from a large Hampstead firm complaining of the failure of the electric light on their premises the previous Saturday, "through which they had lost sales to the amount of £10, for which they held the Vestry responsible." This matter was referred to the Committee for consideration and report.

Llanelly Gas Workers' Dispute.—It appears that there is no cause for fear of an immediate strike at the Llanelly Gas-Works. Mr. W. Thorne, the Secretary of the Gas Workers' Union, has sent an application for an increase of wages for the men. The stokers get 4s. 3d. a day; and the demand is for 5s. The labourers are paid 22s. a week. Mr. A. R. Cawley, the Manager, admits that stokers do get 5s. in other towns, but for far heavier work, while the labourers are better paid in Llanelly than in many other places.

Brigg District Council and the Gas-Works.—At a special meeting of the Brigg District Council last Wednesday, the question of the proposed purchase of the Gas Company's undertaking was considered. A report was presented by a Committee, who had consulted Mr. E. H. Stevenson on the matter. Mr. Stevenson advised that, in a place like Brigg, electric light could not be run separately as a profitable commercial undertaking in competition with gas, though it might be worked profitably in connection with gas, if the two were in the same hands. The Committee were also advised that, if the purchase were effected, the undertaking would no doubt prove remunerative to the ratepayers; and they recommended the Council to take the necessary steps towards acquiring the works. The ultimate decision would, of course, rest with the ratepayers themselves. But unless the Council moved in the matter, the Company would obtain the statutory power for which they were applying, and then the chance of acquiring the undertaking on profitable terms would have gone by. The report also intimated that the Committee believed that the cost of the undertaking would not exceed £15,000. The Chairman (Mr. J. Spring) proposed that a Bill be promoted in Parliament to authorize the Council to purchase the undertaking. This was unanimously adopted. A meeting of the ratepayers to consent to the promotion of the Bill, or otherwise, was convened for last evening.

The Payment for the Restricted Water Supply in East London.—The Secretary of the East London Water Company (Mr. I. A. Crookenden) has been in correspondence with Mr. C. T. Wilkinson, an owner of property, as to the charges for water, and whether it is proposed to reduce them in view to the diminished supply to consumers. Mr. Crookenden wrote that the "insufficient supply" was due to unexampled deficiency of rainfall; but he pointed out that in the worst period of the drought the Company had never supplied less than 19 gallons per head per day for domestic purposes. After reminding Mr. Wilkinson that the East London Company were the pioneers of the constant service system, and that it was only out of sheer necessity that they husbanded the water, Mr. Crookenden added: "I regret that the Directors cannot entertain the idea of a reduction in the water-rates. In addition to the enormous expenditure to which the Company have been put in obtaining water elsewhere, the provision of vessels for the storage of water, the erection of stand-pipes, the employment of water-carts, and, of course, all the expenses of wages, rates, taxes, and so on, have had to be met. You will observe that, had the supply been in municipal hands, the water-rates would not have been reduced by reason of a diminished quantity of water supplied; and I may add that by many municipal authorities a less quantity has been delivered to consumers than by the East London Company." In connection with this correspondence, it may be stated that the various applications against the East London Water Company, set down for hearing before the Court of the Railway and Canal Commission last Thursday, have been dropped; it having been found impossible to get over the special provisions in regard to "unusual drought" contained in the Company's Acts.

METROPOLIS WATER SUPPLY.

Important Schemes for the Forthcoming Session.

Last Saturday the notices required by the Standing Orders of Parliament in respect of Bills to be promoted next session appeared in the customary form in the newspapers circulating in the districts affected. We shall, in due course, give our usual summary of the measures which relate to gas and water supply in various parts of the kingdom; but, in the meantime, we notice those dealing with the water supply of the Metropolis.

Taking first the notice for the Bill to be promoted by the London County Council to enable them to carry out their Welsh water scheme, it sets forth that power will be sought for the construction of a storage and service reservoir at Borcham Wood, in Hertfordshire, and of an aqueduct from a proposed reservoir on the River Yrfon, in Brecknockshire, to the above-named reservoir. Filter-beds are to be made near Edgware and Hendon; and there will be two aqueducts in connection therewith—one commencing at the southern embankment of the Borcham Wood reservoir and terminating at Edgware, and the other starting from the latter place and terminating at Hendon. There will be various road diversions in connection with the scheme. The Council seek to be empowered to enter into, and carry into effect, contracts for the supply of water in bulk or otherwise with any County Council, Urban or Rural District Council, Highway or other Local Authority, and any railway or canal company, and any corporation, body, or persons within the counties mentioned in the notice, and within such limits as may be prescribed by the intended Act; and the Act may confer all necessary and proper powers in that behalf upon all such councils, authorities, corporations, bodies, and persons as will enable them to carry into effect these contracts, and to raise or apply for the purposes thereof the necessary funds and rates. Provision may also be made for enabling any such authority, corporation, or body to carry their water-mains within or beyond their respective districts, and to break up streets, roads, and highways. The counties through which the main aqueduct will pass are Brecknock, Hereford, Gloucester, Oxford, Buckingham, and Hertford. Authority will be sought for raising the necessary money to carry out the scheme.

The Council also notify their intention of promoting a Bill to enable them to acquire the undertakings of the Metropolitan Water Companies, as well as that of the Staines Reservoirs Joint Committee. The purchase is to be effected by agreement or by compulsion; but if by the latter method, no allowance is to be made for compulsory sale. The Bill will contain various provisions relating to Local Authorities outside the Metropolis; and the Council will ask for power to supply water to them in bulk, or to sell or transfer portions of the undertakings. A Sub-Committee of the Council are to be appointed to carry into effect the provisions of the intended Act; and representatives of the Corporation of London and others not members of the Council, may form part thereof.

The scheme of the London Water Companies for connecting their works is indicated in the notice given by them. The Bill to be promoted will require them, within a period to be specified therein, to prepare and submit to the Local Government Board a statement describing the works and things which they may consider necessary to be executed for effecting junctions between the mains, reservoirs, or works of any two or more of the Companies, or for the conveyance of water to the district supplied by any Company in aid of the water for the time being available; and in the event of their not submitting such a statement within the period named, the Bill will empower and require an arbitrator to be appointed to prepare and submit one to the Board. The Board will consider this statement, and make any inquiries which they may deem necessary in reference thereto, and approve the same with such modification therein (if any) as they may think fit. The Board are to require the Companies to carry out the works specified, or any others which may be deemed necessary. The Bill will provide for the payment by the Companies, or some of them, in such proportions as they may agree, or in default of agreement as the Local Government Board may prescribe, of all costs, charges, and expenses which the Board may incur or be put to in reference to any of the matters in question. Provision will be made for the passage of water, in times of drought or emergency, from the mains of one Company to those of another. The Local Government Board are to have power to sanction a temporary augmentation in the quantity of water to be taken from the Thames by the Companies and by the Staines Reservoirs Joint Committee; and the Companies are to be at liberty to increase their pumping capacity. They are also to be authorized to raise money on debentures for the purposes of the Bill. Provision will be made for the appointment by the Companies or by the Local Government Board of the arbitrator above mentioned, whose duty will be to determine any question which may arise between any of the Companies, and whose remuneration is to be arranged in such proportions as may be settled. The Bill will sanction and confirm anything done by any one or more of the Companies before the passing of the intended Act which would have been valid and within their respective powers if that Act had been passed in the session of 1898, and the expenditure of money and the creation and issue of debenture stock by such Company or Companies in reference thereto; and it will vary or extinguish all rights and privileges which would interfere with the objects set forth, and confer other rights and privileges.

The East London Water Company have given notice of their intention to apply for authority to carry out an important series of works. They will comprise a storage reservoir to be situated in the districts of Waltham Cross, Chingford, and Enfield; another in the two last-named districts and in Edmonton; and seven conduits or pipe-lines, one of which will be that referred to in the "JOURNAL" last week (p. 1104), commencing by a junction with the existing conduit of the Company in the Camden Road, and terminating at the boundary of the parish of St. Pancras at the junction of St. Paul's Road and York Road. The Bill is to authorize the Company, for the purposes of the proposed works, to take, divert, pump, and impound waters from the River Lea, and to make and maintain, in any of the parishes and places mentioned in the notice, all such cuts, catchwaters, aqueducts, pumping apparatus, filter-beds, culverts, buildings, machinery, &c., as may be necessary or convenient; and also to empower them, by agreement or otherwise, to purchase or acquire all or any rights of taking or using water of the above-named river. An important

provision of the Bill will be one to authorize the Company to require the owner of any dwelling-house or other property supplied with water by them to provide a cistern or cisterns for its storage; and they will ask for power to "prescribe the size and nature of such cistern or cisterns, and to make regulations with reference thereto, and to provide for the imposition and recovery of penalties for any breach of such regulations," and to enable them to refuse to supply water in the absence of such. The Company also give notice of their intention to promote a Bill to enable them to draw from the Thames, by means of their present intake, or those of any of the other Thames Companies, a larger quantity of water than they are now permitted to abstract. This additional supply is only to be taken in cases of emergency, and with the sanction of the Local Government Board.

The West Middlesex Water Company have given notice that in the ensuing session they intend to introduce a Bill to extend their works. This is in furtherance of the declaration of Mr. E. Boulnois, M.P., the Chairman of the Company, at the half-yearly meeting last Tuesday, as reported elsewhere, to the effect that, in view of the increasing demand in their district, and in order that they may be in a position to convey the additional supply which will be available when the Staines reservoir works are completed, it is proposed to apply to Parliament for power to lay a 42-inch main between the Company's works at Hampton and the reservoirs at Barnes. Besides empowering the Company to lay this additional main, the Bill will authorize them, pending the completion of the Staines scheme (sanctioned by the Staines Reservoirs Acts, 1896 and 1898), and during such other period as may be defined in the intended Act, to take a further supply of water from the River Thames, in such manner and under such conditions as may be agreed upon with the Conservators. Additional capital will be required.

Increased Supply in the East-End—The County Council and the Corporation.

At the meeting of the Directors of the East London Water Company last Thursday, it was arranged that the supply should be extended several hours daily, commencing from to-morrow, by the abolition of the intermediate shutting off and on between the morning and afternoon services. The extended supplies will be given district by district. The dates of commencing in each district will be duly announced.

At the meeting of the Court of Common Council last Thursday, a letter was read from the Clerk to the London County Council (Mr. C. J. Stewart), forwarding a copy of the report of the Water Committee of that body on the London Water Supply, and the resolutions passed by the Council to promote in the ensuing session a Bill for the purchase of the Water Companies' undertakings, and also a Bill for the introduction of a new water supply from Wales. The Council desired to know if the Corporation still wished to be represented on the proposed Water Authority, and if they might count on their support in the prosecution of the Bills in Parliament. Mr. Wallace thought that in a matter of such great importance the Corporation ought to have an opportunity of considering their general policy as regarded the water supply of the Metropolis; and he moved that the communications be referred to the Committee of the whole Court for consideration. Mr. H. Clarke said the Court had already signified their approval of the general principle of the water supply of London being in the hands of a public body, but he trusted it would not be the London County Council. It was nevertheless desirable that the Court should carefully deliberate upon the very serious aspects of so important a matter. Mr. White thought the Corporation would be willing to abide by their old arrangement with the Council to be adequately represented upon the proposed Water Authority, whether it was the Council or a special body to be created by statute. The motion was carried.

WEST MIDDLESEX WATER-WORKS COMPANY.

The Half-Yearly General Meeting of this Company was held last Tuesday at the Company's Offices, Marylebone Road—Mr. E. Boulnois, M.P., in the chair.

The Chief Clerk and Secretary (Mr. F. H. Wybroo) read the notice calling the meeting, and subsequently the report of the Auditors. This stated that the cash balance at the bankers amounted to £8182, less outstanding cheques £3256. A further sum of £5000 had been transferred from the dividend and interest account to the reserve fund, which now consisted of £20,000 of Metropolitan consolidated 3 per cent. stock, £26,000 of Metropolitan consolidated 2½ per cent. stock, £7250 of New South Wales 3½ per cent. inscribed stock, and £6800 of Victorian Government 4 per cent. inscribed stock, in addition to an uninvested balance of £5041. The capital was the same as reported last half year—namely, £1,641,863. The total expenditure on works had been £1,653,117, including £24,105 spent this half year; the expenditure being £11,253 in excess of the capital. The gross rental for the half year ended Michaelmas last amounted to £133,093, showing an increase of £4320 as compared with the corresponding period of the previous year. The water-rental received during the six months to Sept. 30 last, was as follows: On account of rates to Lady-day, £58,776; and to Midsummer, £58,814. The amount received for street watering for the season 1898 was £37, making a total of £117,627. The balance to the credit of the dividend and interest account was £63,010.

The Chairman, in moving the adoption of the report and accounts, and the report of the Auditors thereon, said the Company were still advancing; practically it was impossible for them to stand still. The requirements of a rapidly growing district compelled them to keep going with the times, and to enlarge their works in order that they might carry out their statutory obligations to supply the new population which was rising in the north-west part of London. In addition to this, it had always been the policy of the Board to keep the works and mains in the highest state of perfection, so that the property might not be depreciated in any way. The report referred to the exceptional and long-continued drought which had prevailed during the past half year, and stated that, notwithstanding this, the supply throughout the Company's district had been fully maintained. Taking all London throughout, it was quite clear there had been no such thing as a water famine. While in many of the provincial towns—especially those which were under municipal government—the inhabitants had been somewhat stinted, the whole Metropolis, with the exception of one district, had had an ample and continual flow of water, notwithstanding the extraordinary demands which had been made upon the Companies by reason of the hot and dry summer. He thought that it said much for their noble river that its magnificent supply had never failed all through the summer. Though it might be true that there had been a somewhat reduced flow of water over Teddington Weir, no inconvenience had been suffered; and, as far as he was aware, no complaint had been made. He supposed that in the rivers throughout all England there was not an instance where the normal flow had not been diminished somewhat during the past summer whether water had been abstracted from them for water supply or not. The report referred to the progress of the works at Staines. As they were aware, their Company, the New River, and the Grand Junction, were joined in a Committee to carry out certain works at Staines which, when completed, would give them storage for something like 3300 million gallons of water. The works were going on most rapidly, and the weather they experienced in the summer—everything, in fact—had been favourable to the rapid development of the scheme. No one could appreciate the enormous magnitude of the work, and what it signified, unless he visited the spot and saw for himself. It would indicate somewhat how things were going on if he stated that every day for some time past about 2000 men had been employed on the works at Staines. In view of the increasing demand for water in their district, and in order that the Company might be in a position to convey the additional supply which would be available when the Staines reservoirs works were completed, the Directors proposed to apply to Parliament in the ensuing session for the necessary powers to lay a 42-inch main between the works at Hampton and the reservoirs at Barnes and Barn Elms. It was not necessary to go into the details of this Bill. They might believe that it had become essential, or the Directors would not apply to Parliament (especially just now) for powers to raise more capital and carry out further works. There would be an opportunity of explaining the Bill at what was called the Wharncliffe meeting, which they must hold before the Bill was brought before the House of Commons. The report also stated that the London County Council had decided to introduce next session Bills for the transfer to them of the undertakings of the eight Companies, and for bringing a supply of water from Wales. It was a somewhat unusual course to apply to Parliament for legislation on a subject which was still *sub judice*. The Royal Commission on the water supply to London were still sitting, and would certainly be obliged to sit for some time longer before they could make a complete report to Parliament. The justification of the County Council was that the exigencies of East London required an immediate remedy; and the immediate remedy of the County Council depended upon the Bill which they proposed to introduce for the purchase of the eight Water Companies. With the loss of this Bill, the County Council's remedy for East London, about which such a parade had been made, disappeared also; for the power to the Council to connect and lay mains and other works necessary in order to enable them to protect any part of the Metropolis from want of water, was only a clause in the Purchase Bill, and stood to fall with that Bill. Fortunately for East London, and for the rest of the Metropolis, the Companies themselves had a full and immediate remedy should necessity arise. They were prepared, by way of precaution and insurance, to make the necessary connections, in addition to those which had already been made for the relief of East London. They were prepared to make these connections at once, and whether it was legal or not—believing that they would receive an indemnity from Parliament for any act they might commit in this direction. At all events, they believed that by so doing they would put an end to all doubt as to whether London would not in future, in all parts, get a complete supply, and in all seasons and contingencies. But the proposed Purchase Bill of the London County Council contained the same objectionable features which had characterized their previous Bills in this direction. In the first place, the County Council still demanded a special arbitration clause. He was at a loss to understand why they should be more favoured in this respect than other municipal bodies. When one party coveted the possessions of another, and desired forcibly to expropriate him, the existing law provided only one mode of procedure—in such a large undertaking as this, at at all events—a mode of procedure which had always been recognized, and which had governed all cases. Provided the parties could come to no agreement, the assessment of value had to be determined by an arbitrator under the usual conditions; and he saw no reason why the arbitrator in this case should be fettered by instructions, as the County Council proposed—instructions which were one-sided, partisan, and prejudicial. He maintained that the Companies were entitled to liberal, and even to handsome treatment, for they had deserved well of the community in all respects. It seemed to be forgotten that these undertakings were originated by private enterprise for the public good. For years no profits were made, no dividends were earned; and now, after the undertakings had been administered with great care and pains, after they had been brought to a most complete state of perfection and were making a fair profit, a public body came forward, and endeavoured to buy them at the price of old iron. The second objectionable feature he observed in the Purchase Bill of the County Council was the proposal that the property should vest in the Council six months after the passing of the Bill. He did not believe that such a bare-faced proposal had ever been made before by any public body. It was justified by the County Council by the assertion that it would be accompanied with provisions assuring the shareholders against loss of income during the interval between the transfer and the payment of the purchase-money. But what the shareholders would look for was not an assurance against loss of income for a while, but against loss or diminution of the capital which they had invested. The plan of the London County Council was practically that the proposed purchaser might first seize the property, and then dictate the terms of purchase. In other words, at the end of six months the County Council were to be able to take over not only the mains, reservoirs, and all the works of the Companies, but also the staff and the books. The Directors, whom the proprietors not unnaturally expected to protect their interests, were, if the Bill should ever pass into law, to be bundled into the street in six months; and the staff, who had ever been loyal to their Boards, would come under the influence and dictation of

new masters. He believed that every device which ingenuity could suggest would be resorted to for delay, for depreciating the properties, and for urging the arbitrator to cut down the value of the undertakings; and the proprietors during this protracted arbitration would have lost the services of those to whom they would naturally look for aid and protection—the Directors. This might be the commercial morality of the London County Council; but it was not the recognized mode of fair dealing as between man and man. He did not believe for a moment that such a one-sided proposal would commend itself to the House of Commons, or, if the Bill should pass the second reading in that House, would commend itself to any Committee to whom the Bill might be referred. It had been asserted frequently that the County Council had not been met by the Water Companies in anything but an uncompromising attitude. This was not quite so, for the Companies had always expressed their willingness to take into consideration any proposal for purchase which might be put before them; but up to the present time no such proposal had been made. When they considered that not a Bill had been brought in by any Metropolitan Water Company during the last nine years for improving and extending the supply to their particular district (for the benefit, of course, of the consumers) which had not been met by the most strenuous opposition by the County Council; when they considered the arbitrary and hard conditions which had been imposed upon the Companies, conditions to which no similar undertaking (whether gas, railway, tramway, or even a provincial water undertaking) had been subjected; when they considered the language which was used about the Water Companies, and particularly about their Directors, by the Progressives and their organs in the Press—it was not very surprising that the Water Companies held that body at arm's length; and he could assure them that they would continue to hold the County Council at arm's length unless the latter could approach them in a fair, just, and honourable spirit. He trusted the proprietors would accept the assurance of the Directors that while they were in office they would continue to guard the interests of the Company.

The Deputy-Chairman (Mr. Jackson Hunt) seconded the motion.

The Chairman, in answer to Mr. Fowler, stated that the 42-inch main which they intended asking Parliament next session for powers to lay would have to be provided for out of capital, which would be mentioned in the Bill.

The resolution was carried unanimously; and afterwards a dividend was declared at the rate of 10 per cent. per annum on the consolidated stock for the half year to Sept. 30 last, less income-tax.

Mr. Nicholay afterwards proposed a vote of thanks to the Chairman and Directors for their diligent attention to the business of the Company, and for their able and satisfactory management of affairs. He felt sure he was only expressing the feeling entertained by all the shareholders when he said that they were exceedingly indebted to the Directors for their strenuous exertions to maintain the interests of the proprietors against the attacks of the London County Council.

Mr. Fowler seconded the motion, which was carried unanimously.

The Chairman, in acknowledging the vote, assured them that the Directors had at all times the interests of the proprietors thoroughly at heart. For the past ten years—or nearly so—a great deal of vigilance and care had been necessary to protect the property; and the same vigilance and care would be at their service in the future.

The proceedings then terminated.

SALE OF NEW RIVER COMPANY'S SHARES.

In view of the present position of the London Water Question, unusual interest attached to the sale of shares and stock of the New River Company, conducted by Mr. E. H. Bousfield, of Messrs. Edwin Fox and Bousfield, at the Mart, Tokenhouse Yard, last Wednesday. There were offered for competition several fractions of a King's share, £4000 of 3 per cent. debenture stock, and 30 new shares of £100 each. In submitting the various fractions of a King's share, Mr. Bousfield commented on the exceptional advantages possessed by New River freeholds. The proportion of dividend in respect of every 104th part of a King's share which he was about to put up was stated in the particulars to be at Midsummer last at the rate of £27 6s. 3d. per annum; but it was not fair to take this sum simply as the basis for capitalization, as there were elements in connection with the property which were not comprehended in that return. The income of the New River Company had greatly advanced in the last 25 years—rising from £284,203 in 1871 to £588,595 in 1897. The future revenue had, he said, all the elements of expansion which the revenue had had in the past. They might anticipate that within the next 25 years the present income would be doubled again. It might be said that long before another 25 years had elapsed the Water Companies would be taken over by the London County Council. When, however, he was a boy, this was in the air, where he believed it would be for a very long time yet. In spite of the County Council introducing a Bill, as they were now proposing to do, for the purchase of the undertakings of the Water Companies, his own impression was that when the time came, as probably it would, for taking over these properties, they would not be handed to the London County Council—a body composed of highly-respectable individuals, but one who had set before themselves political aims not conducive to the satisfactory management of such enterprises as the Water Companies of London—but a Water Trust would be established, who would buy them at a fair price under the Lands Clauses Act. The value of the property which he had now to dispose of would then be very greatly increased. There was, he further remarked, one very satisfactory feature in the County Council's proposed action this time—they clearly recognized the expediency of buying. There was no longer any threat such as had previously been held over the Companies of endeavouring to import a dual system of water supply into London. Coming to the properties he had to sell, he stated that one of the New River Company's estates—perhaps the most important, but still only one of them—was that at Clerkenwell, of 50 acres, situate within a mile of the Bank of England. Within 20 years the whole of this area would be in the Company's hands available for development. He then offered lot 1, a 104th part of a King's share. The first bid was £930, which advanced by offers of £10 each to £1000, at which figure the property was sold. The next similar lot realized the same price; but the other 11 lots produced £950 and £960 each. Eight 112th parts of a King's share (the proportion of dividend to each last Midsummer being at the rate of £24 17s. 10d. per annum) were then offered. The bidding opened at £750; but the first four lots were disposed of at £860 each, the others fetching £845 and £850 each. Fifteen 120th parts of a King's share were next submitted; the proportion of dividend to each at Midsummer last being £23 13s. 5d. The first bid was £750; but for each lot £790 was realized except the last, for which £795 was obtained. For the five 80th parts of a King's share, on each of which the proportion of dividend last Midsummer was at the rate of £34 13s. 8d. per annum, £1185 each was secured; the first bid being £1100. A 64th part of a King's share was afterwards offered, and fetched £1480; the proportion of dividend in respect of this lot at Midsummer last being at the rate of £43 7s. per annum. For the 3 per cent. "C" debenture stock, prices were given varying from £107 to £109 per cent., as against an average at the last sale of the stock of £118 17s. 6d. per cent. The 30 new £100 shares, the dividend in respect of which at Midsummer last was at the rate of £13 5s. per annum, realized £445 each for the first 25 lots; the other lots being purchased at £440 each.

PORTSMOUTH WATER COMPANY.

Half-Yearly Report.

At the half-yearly general meeting of this Company on Thursday, the Directors will report a balance of £23,261 available for distribution. Out of this they recommend that the full statutory dividends should be paid and that a sum of £822 should be carried to the arrears of dividend fund, which, with the sum already standing to the credit of the fund, will enable a similar distribution to be made in respect of these arrears as on previous occasions. This, after the usual deductions for void houses, &c., will leave a balance of about £7426 to be carried forward. During the six months ending Sept. 30, 2742 yards of additional service mains were laid in new roads; making a total of about 46 miles of trunk mains and 123 miles of service mains. The number of additional services connected with the mains during the half year was 469; making the total number of premises now under constant supply by the Company in all their districts 38,414. The quantity of water pumped from Havant and Bedhampton during the six months was 1,249,976,000 gallons, or an average daily supply for all purposes of 6,868,000 gallons; being a decrease of 579,000 gallons daily as compared with the corresponding period of last year. The quantity supplied for domestic use is equivalent to an average of 27 gallons daily per head of the population exclusive of all supplies by meter. The number of fire hydrants now fixed in the Company's districts is 3036. The Engineers (Messrs. J. Quick and Son) report that the Company's engines, boilers, reservoirs, and works are in good order. The recent unusually prolonged drought caused much anxiety and distress throughout the country; but the Directors were able to continue the usual constant service at high pressure, which has now existed for eighteen years, without any such restrictions as have had to be applied in other large towns.

BRIDLINGTON WATER-WORKS PURCHASE AWARD.

The Bridlington Town Council last Tuesday held a special meeting to receive the Arbitrators' award in respect to the purchase of the water-works. Before the Solicitor (Mr. F. J. Brigham) introduced the award, it was agreed that it be referred to the Water Committee without comment, in order that members should have an opportunity of considering it before expressing a hasty opinion. The Arbitrators (Mr. G. F. Deacon for the Council, and Mr. Thomas Newbigging for the Company) awarded that the price to be paid by the Council should be £66,260, in addition to the costs incidental to applying for and obtaining the Bridlington Water Act of 1896, and the value of the Company's stock-in-trade as from March 12, 1899. The reserve fund, amounting to £794 2s. 11d., with interest to March 12, 1899, will become the property of the town. The award provides that two officials of the Company—the Secretary and Manager—shall, in the event of leaving or being discharged from service within five years from the date of purchase, receive an annuity for life of one-half their present salary, or if after the expiration of five years, an annuity of two-thirds of their present salary. It is ordained that the purchase shall be completed by the Council by March 12, 1899; and failing the completion of the purchase at that date, interest shall be paid at the rate of 5 per cent. on the purchase-money until the actual payment, which must take place not later than June 12, 1899. The award was referred to the Committee as arranged.

The Whitchurch Gas-Works Purchase Scheme.—A meeting convened by the District Council was held at Whitchurch last Wednesday, for the purpose of ascertaining the views of the ratepayers regarding the proposal to purchase the gas-works for £37,000. Several members of the Council recommended the purchase upon commercial grounds; but the scheme was opposed by a number of ratepayers, who contended that electric lighting works could be erected at less cost. Upon a vote, the scheme was rejected by a large majority.

The General Gas Company of France.—The report of this Company for the twelve months ending June 30 shows that the result of the working in that period was a sum of 2,976,960 frs. (£119,078), as compared with 2,793,058 frs. (£111,722) in the preceding year. Adding the balance brought forward (486,245 frs.), there was a total of 3,463,205 frs. (£138,528). Deducting the general expenses, the amount required to pay the interest on the bonds, the Directors' fees, and other charges, there was left a disposable balance of 1,146,045 frs. (£45,842). The Directors recommended that 300,000 frs. should be distributed among the shareholders, at the rate of 7 frs. 50 c. per share; that 500,000 frs. should be added to the provident fund; and that the balance of 346,045 frs. should be carried forward. At the recent meeting of the Company this was agreed to. The dividend declared was 32 frs. 50 c. per share—the same as last year; and the reserve fund was brought up to 1,352,235 frs. (£54,089).

METROPOLITAN WATER SUPPLY COMMISSION.

Thirty-fourth Day—Monday, Nov. 14.

(*Viscount* LLANDAFF, Chairman, *Major-General* A. DE COURCY SCOTT, R.E., *Mr.* A. DE BOCK PORTER, C.B., and *Mr.* R. LEWIS.)

The Commission sat at the Guildhall, Westminster.

The following are the Counsel engaged: Mr. POPE, Q.C., and Mr. CLAUDE BAGGALLAY, Q.C., for the New River and the Southwark and Vauxhall Companies; Mr. LITTLER, Q.C., and Mr. LEWIS COWARD for the Kent Water Company; Mr. PEMBER, Q.C., for the Lambeth, East London, Grand Junction, and West Middlesex Water Companies; Mr. RICKARDS for the Chelsea Water Company; Lord R. CECIL for the Hertfordshire County Council; Sir JOSEPH LEESE, Q.C., M.P., for the Kent County Council and Kent Local Authorities; Mr. BALFOUR BROWNE, Q.C., and Mr. FREEMAN, Q.C., for the London County Council; Sir R. NICHOLSON for the Middlesex County Council; and Mr. GABRIEL P. GOLDNEY (Remembrancer) for the Corporation of the City of London.

Mr. *W. B. Bryan*, examined by the CHAIRMAN, said he had been for sixteen years Chief Engineer to the East London Water Company, who were now supplying a population of 1,300,000. The daily quantity of water delivered last summer, on the average was: June, 42,563,000 gallons; July, 44,959,000 gallons; September, 33,149,000 gallons; and October, 34,202,000 gallons. In August, up to the 22nd, when the intermittent supply was commenced, the average was 43,170,000 gallons daily; the average for the whole month being 40,656,000 gallons. In September the supply was about 25 gallons per head per day, 7 gallons of which were for trade purposes.

The CHAIRMAN: I have received a letter from a Mr. Glover, of 111, Green Street, Upton Park, who tells me that on many days the water never reached his cistern, which placed him in a worse position than those who got it from the mains?

Witness: If he had a tap for drinking purposes at the usual height, he would have had the same supply as others in the district. A difficulty does arise with very high cisterns. When the water is turned on it naturally has to fill all the lower cisterns first; the consequence being that only when the lower cisterns are full does the water reach the higher ones. A house solely furnished with a high cistern would get water from the draw-off taps on lower or ground cisterns.

Have there been cases in which you attribute the fact that the water has not reached individual consumers to the turning on of numerous taps for an unnecessary length of time?—There have been an enormous number of cases in which the water has not reached the consumers owing to this cause. The hours of supply by the Company during the drought varied; but time-tables were posted in different parts of the district notifying when the supply would be turned on and off. The water was turned on twice daily, and lasted for two hours. One street would have it for two hours starting at 6 a.m.; the next commencing at five minutes later; and so on.

A man who was in the 6 to 8 o'clock district, would either have to get up at 6 in the morning to open his tap, or leave it running to fill any vessels he might have for storing water?—Unless he had a proper cistern that would be so.

Does this not account for the taps being left open?—To some extent it might. The Company are still giving four hours' supply daily throughout the district.

Major-General SCOTT said he had roughly worked out the total quantity of water supplied by the Company during the four months as follows: July, 1,393,729,000 gallons; August, 1,260,336,000 gallons; September, 994,470,000 gallons; and October, 1,060,262,000 gallons—a grand total of 4,708,799,000 gallons.

Witness handed in a table showing that in 1898 there were pumped into the Company's mains from the Lea: In July, 9,479,000 gallons; in August, 6,354,000 gallons; in September, 1,032,000 gallons; and in October, 4,693,000 gallons. The corresponding figures for 1897 were: July, 34,611,000 gallons; August, 34,803,000 gallons; and September, 32,202,000 gallons. This included what was drawn from storage. It might be that the volume coming from the Lea was somewhat smaller than the figures given; the balance being made up out of storage. The difference in the figures (say) for August was enormous, and indicated that the volume of the Lea was lower than it ever was before. The supplies the Company drew from the Thames in the last four months were: July, 9·80 million gallons; August, 9·50 million gallons; September, 9·72 million gallons; and October, about 9·80 million gallons—much larger quantities than in 1897. The corresponding figures of the daily supply drawn from wells was: July, 7·17 million gallons; August, 9·55 million gallons; September, 9·44 million gallons; and October, about 9 million gallons. These quantities were considerably more than double as much as was pumped from wells in 1897. As regarded the Thames, they pumped as much as they could get from it—a little over 10 million gallons. During the four months mentioned in 1898, the Company did not pump their wells to the extent of the full yield, as they did not work the pumps quicker than was safe.

The CHAIRMAN: Now, practically, from these two sources—the Thames and the wells—could you have got more water for your district than you did during the four months?

Witness: Not from our Thames main. It was carrying as much as it would be safe to pass through it. We could have got a little more from our wells, but not without some risk of working the deep-well pumps at too great a speed.

In answer to further questions, witness said the reservoirs of the Company were pretty well exhausted in July, when some 12½ million gallons daily were taken from them. The supplies from the New River Company averaged daily 1,013,000 gallons in July, 5,346,000 gallons in August, 6,129,000 gallons in September, and 6,093,000 gallons in October. Nothing was obtained from the Southwark and Vauxhall Company in July and August; the first water from them being received on Sept. 19. In September, the daily average quantity from the Company was 2,029,006 gallons; and during October, 4,801,000 gallons. The supply had never reached 6 million gallons daily; and it was not increasing. The Southwark and Vauxhall water entered the East London area at a short distance east of the Tower, and was allocated into a district as though the area were an integral part of the Southwark and Vauxhall Company. It was very difficult indeed to so arrange as to take in a large quantity of water. It was weeks before the East London Company could take as much as the Southwark and Vauxhall Company could afford them. The amount supplied daily by the Southwark and Vauxhall Company had been greater than 5 or 6 million gallons; but owing to one or two bursts, a day's supply had been lost—thus reducing the average to 4,800,000 gallons. Witness wished it to be distinctly understood by the Commission that there was no truth whatever in the suggestion that the East London Company's mains were of less strength than those of any other Company. The same founders made them; they were laid in the same way—perhaps by the same contractors; the iron was equally good; and there was no reason whatever for assuming that they were not equal to those of any other Company. In fact, experience proved that they were quite as good as those in any part of England. The Kent Company's supply was only received in September and October last; and the largest amount was 206,000 gallons. This quantity would decrease rather than increase, because the pressure on the East London side was higher than it was in September.

Major-General SCOTT said he had roughly worked out the total of the contributions to the East London Company from all outside sources. They were: July, 31,403,000 gallons; August, 165,726,000 gallons; September, 250,920,000 gallons; and October, 343,790,000 gallons—a grand total of 791,839,000 gallons. There were two small mains from the Kent Company, of 4 inches diameter. It was quite practicable for the Kent Company to give more water by laying a new main through the tunnel, and on the south side. The drought commenced about sixteen months ago. The flow of the Lea began to fall off in June of last year; and since then it had been very small indeed. Even in January of this year it was only 48 million gallons a day; in February, only 26 million gallons; in March, nearly 32 million gallons; April, 19 million gallons; May, 23 million gallons; June, 19 million gallons; July, 12 million gallons; August, 6 million gallons; September, 2 million gallons; and October, he thought, nearly 5 million gallons. The total flow of the River Lea in July was 13·9 million gallons daily, which included what the New River Company allowed to flow down for the benefit of the East London Company. The latter Company took roughly 9·5 million gallons of this quantity. During the four months of drought the navigation had what it wanted. Also the Company pumped water from the Thames to the lower reaches; but he could not tell how much, because it was impossible to gauge it. They pumped up as much as kept the navigation to its proper head level; but none was pumped into the upper reaches from which the East London Company took their supply. This pumping operation had been done twice before recently—once for about five weeks in 1896. There were no records to show that there had been any other drought like the last in intensity and duration.

Mr. DE BOCK PORTER: Has the discharge from the wells in the neighbourhood of the Lea been reduced in the same proportion?

Witness: That I can scarcely answer. We have found no diminution whatever in their yield at the present moment over the yield at the commencement of the drought.

The CHAIRMAN: Not only no diminution, but you have been getting an increased quantity from your wells?

Witness: We have.

Do you see any connection between the increased supply you have got from your wells and the diminished flow of the Lea?—None; the reason being that the Company's wells are situated at the lower end of the valley, and we take what water is flowing underground and is running to waste.

Further examined: The lack of storage cisterns in the Company's district aggravated the hardship of the drought very much. It might be in one or two isolated cases the water did not rise high enough to fill the cisterns. Witness believed there was a clause in one of the Company's Acts which said that cisterns were to be fixed; but it did not specify their size or character. The consequence had been that, to comply with this clause, in some cases cisterns about as big as a hat had been put in. In many instances—especially in some portions of the Essex district—a builder would put in one cistern. He would then apply for the water to be laid on; and a day later he would remove the cistern and take it into the next house. One cistern would thus do duty for a whole row of houses.

Some discussion then took place as to the power of the Company with regard to cisterns; Mr. Balfour Browne asserting they had power to refuse a supply unless the cisterns were proper, and witness and other Counsel stating that the power was very doubtful, and, if it existed, difficult to enforce. Eventually, the matter being before the Railway Commissioners, the subject was left.

Mr. DE BOCK PORTER: Have you formed any idea of the time when you will be able to resume a proper supply of water?

Witness: No, I have not. It depends upon the flow of the river. The flow of the Lea is very minute at the present time; but we have increased the amount of water in store considerably during the last month. I think it wise to husband this store, in case of severe frosts coming; but our position is very much better than it was a month ago.

You see no immediate prospect of running a proper supply?—No; but I think that when rain comes, the ground is so saturated now that we shall have an increased flow.

Examination continued: He had followed the available volume this year in estimating the supply from the Lea next year at 10 million gallons in July, 6 million gallons in August, 1 million gallons in September, and 4 million gallons in October. The quantity estimated for as coming from the storage reservoir was nothing in July, 3 million gallons in August, 7 million gallons in September, and 2 million gallons in October. Adding these two sets of figures together, gave an amount very much short of what the Company usually drew from the Lea. He counted on 12 million gallons each from wells and from the Thames. They were only entitled to draw 10 million gallons daily from the Thames; but 2 million gallons would come from the springs at Hanworth. The Company's mains and pumps were sufficient to pump 10 million gallons daily from the Thames; but to get the extra 2 millions, it would be necessary to cut the main in two, and then, by arrangement with the Grand Junction Company, to pump the water from Hanworth into the Campden Hill reservoirs, and the Grand Junction Company would pump it into the East London reservoir in Finsbury Park. With regard to the wells, he thought more than 12 million gallons would be obtained from them, because the engines at every well would be doubled

next year, so that whenever one set of pumps had to be overhauled the other set would be available. Then he counted on 6 million gallons daily from the New River Company, with the assistance of the Grand Junction and West Middlesex Companies, through the Oxford Street connection; and a further similar quantity from the Southwark and Vauxhall Company. He estimated the storage at the beginning of July next at 1200 million gallons.

Mr. De Bock Porter: What prospect is there of your being able to fill your reservoirs this year?

Witness: If we have no rain, we shall not be able; if we have a moderate amount of rain, we shall.

But you want all your increased supplies, do you not, for your customers?—Yes; but we could do that by purchase from the other Companies until our reservoirs are full.

The Chairman: If you are to avoid another failure to supply next year, you must be able to fill your reservoirs by the end of July?

Witness: Yes; or have 700 million gallons in store.

Major-General Scott gave the following as the total of the estimated supplies of the Company from all sources in 1899; the totals being based on figures furnished by witness: July, 1426 million gallons; August, 1395 million gallons; September, 1320 million gallons; and October, 1302 million gallons—altogether 5443 million gallons. This quantity, less the amount supplied in similar months this year from the resources of the Company, left a deficiency of 1,526,042,000 gallons, which, divided over the four months, gave an average deficiency of 12,406,830 gallons daily.

Witness (continuing) said that was more than they expected to obtain from the New River and Southwark and Vauxhall Companies; but this only meant that in the 123 days they would deplete their reservoirs by 50 million gallons more, unless more water was obtained from the Kent and New River Companies.

Mr. De Bock Porter: You are withholding water from your consumers now in order that you may fill the reservoirs for next year?

Witness: To some extent. We are doing it for their benefit, as trustees.

Still the consumer continues to pay for his full quota of water?—Yes; I suppose he does.

The Chairman: There is no doubt he does. He pays for the full constant supply; and you are condemning him for months to an intermittent supply.

Mr. Pember: He is not entitled to a constant supply if there is drought.

The Chairman: It strikes me as a *casus omissus* in the Act, that there should not be a stoppage of the rates as well as of the supplies.

Witness, further examined, said in estimating the water that would be needed next year, he reckoned on an increase of population supplied of 25,000, which, at 30 gallons a head daily, meant an increased consumption of 750,000 gallons. With regard to inter-communication, the Companies had the means enabling them to get over 6 million gallons daily from the New River Company, and between 5 and 6 millon gallons from the Southwark and Vauxhall Company. The connection with the New River Company would convey a large volume beyond the 6 million gallons—a volume dependent on what the Company, with the help of the West Middlesex and Grand Junction Companies, could supply. The inter-communication with the New River was the River Lea. If the two Companies could supply the New River Company with a considerable quantity, the New River could release from the East London, in the Lea, the same amount in addition to what that Company had to spare at Hertford. The Grand Junction and West Middlesex Companies might be able to supply a further 2 millions.

The Chairman: Therefore the existing communications bring you all that you want for next year?

Witness: They do.

Then you do not want the extra main from the Nunhead reservoir to the Tower Subway?—So far as we are concerned, the 6 million gallons daily that they can pass us through will be ample for our purpose, according to my estimate.

You do not want any inter-communication at all?—I am quite content with this.

Mr. De Bock Porter: Will the inter-connection with the Southwark and Vauxhall Company give all that they can spare?

Witness: No; I think not. They will be able to spare more than the 6 million gallons.

Major-General Scott: How many years will it be before you can throw overboard these connections with other Companies for the purpose of supplementing your own supply?

Witness: It will take, I should think, two years at least to make the 1000 million gallons storage.

But then you have to get more storage than that if you take your 30 million gallons from the Lea?—The 1000 million gallons extra storage would in 98 or 99 per cent. of droughts give us the 30 millions; but in an extraordinary drought like this, it would not. That is the reason I am advising my Directors to go to Parliament again for further storage. If another drought like the present occurred next year, or in any year till 1904, with the help of the other Companies and through already existing connections, the Company would be able to give a constant supply, even though the population in, say, four years had increased by some 100,000, involving a further consumption of 3 million gallons daily.

Mr. De Bock Porter: Then you are not likely to be independent of the other Companies for some years to come?

Witness: I hope in two years we shall be independent of them.

By Major-General Scott: If the season two years hence were very abnormal, like the present, the Southwark and Vauxhall and New River Companies' connections might have to be again used; and he thought it would be well to lay the main from Nunhead to the Thames Subway, in view of a possible increase of supply from the Southwark and Vauxhall Company. The main could be laid in about six months.

The Chairman: In the interests of your Company, you think Sir Henry Knight's suggestions would be sufficient?

Witness: I do.

Do you know whether typhoid has increased in your district lately?—I cannot say.

By Mr. Pember: One flood in the Lea, of (say) 14 million gallons daily, though the first would have to be let pass, would go far towards filling the 1000 million gallons of storage. With the new reservoirs which would be before Parliament next session, the Company were making considerable provision to take in flood water themselves. The proposed scheme of this year was intended to give something like 4000 or 5000 million gallons storage. He had no doubt whatever in anything like ordinary seasons the Lea would, by its flood waters, provide the amount of storage which the reservoirs would hold.

Cross-examined by Mr. Balfour Browne: With the present means of inter-communication, he believed the East London Company could tide over a drought as serious as that of this year.

Mr. Balfour Browne: In two years, if all goes well with your present works, do you think you could do without the assistance which is put down in your table both from the New River and Southwark and Vauxhall Companies?

Witness: In normal seasons, we could.

And if the scheme which you are going to submit to Parliament this year is sanctioned, even in abnormal seasons you would be able to do without it?—When finished, certainly.

Witness was subjected to a further cross-examination, with a view to showing that the pumping that was going on in the Lea Valley was intercepting water which would otherwise go to increase the flow of the Lea. He however maintained that the water pumped was water which would otherwise have flowed into the tidal portion of the Thames, and that, therefore, it could not affect the flow of the Lea.

The Chairman: You say it is an accidental coincidence that the more you pump from your wells, the less water there has been in the Lea?

Witness: That has been due to the minute rainfall. For the twelve months ending September we have only had an average of 12¾ inches, instead of 25 inches.

Further cross-examined by Mr. Balfour Browne: The 6 million gallons the East London Company were receiving from the New River Company cost altogether about £178 per day, or £5414 per month. If, instead of the two 4-inch pipes now passing through the Thames Subway, there was a 24-inch main, and about 2 miles of main to the south of the river were laid, the quantity that could be passed from the Kent Company would be about 6 million gallons daily—supposing the Company had it to give. The East London Company were supplying the previous week a little over 35 million gallons a day as nearly as he could tell; and they were still receiving aid from the New River, Southwark and Vauxhall, and Kent Companies.

Thirty-fifth Day.—Tuesday, Nov. 14.

All the Commissioners were present, except Mr. Cripps and Mr. Mellor.

Mr. *Bryan* said with reference to the question of typhoid, about which the Chairman put a question the previous day, he had examined the Registrar-General's returns for the past six weeks, and found that in the eastern districts supplied by the East London Company, for the six weeks ending Nov. 5, the number of deaths from typhoid were 1 per 39,000 people living; in the central districts not supplied by the East London Company, 1 per 33,000 people living; and in the northern districts, also not supplied by the East London Company, 1 per 31,000 living. The eastern districts, therefore, compared very favourably with the other two.

Cross-examined by Lord R. Cecil: The Company had several more wells in course of construction; and at some of the existing wells the tunnels were being extended. The quantity to be reserved for navigation was about 5,400,000 gallons daily. In July, the quantity flowing down the Lea was 3·4 million gallons; but what went down the Lea as far as Hertfordshire was concerned, was 13·9 million gallons. The quantity left to go down the Lea in August was ½ million gallons; and in September, about 1 million gallons. In no case did the Lea Conservancy enforce their statutory rights under the Act of 1855 in regard to this matter.

In reply to Mr. Pember, witness went again into the question dealt with the previous day regarding the water the Company pumped from wells. It was a difficult and complicated question; and to elucidate it, he produced a rough diagram showing the geology of the district. The London clay, he said, cropped out at Hoddesdon, which was about 90 feet above mean tide in the Thames. Any water getting into the permeable strata at Hoddesdon—that place being 90 feet above the Thames—whether he pumped or not, would, by gravitation, find its own level. The water pumped at the lower reaches of the Lea could not affect the river at Hoddesdon, because the reaches being below Hoddesdon the water would go down, and it was now finding its way into the Thames.

The Chairman remarked that, though the effect might be slow, yet the pumping must deplete what would flow into the chalk and sand.

Witness said it did deplete the basin somewhat; but the basin being so much lower than the river at this point, the water would not benefit the Lea, but the Thames.

As you pump, it must to that extent deplete it, though the effect may not be observed for some time?—That is so to some extent.

I understand your point is that whatever you are taking you are not robbing the Lea, because the Lea has irremediably lost it, if you did not take it?—That is so.

Mr. Pember: It is a substitution of one outlet for another.

The Chairman: Suppose you did not pump at all, then the whole of this sand and chalk would get saturated with water, which would solely escape into the Thames?

Witness: Yes.

Being saturated, it would take in no more water above Hoddesdon?—If it were fully saturated, it would take in no more.

Any more rain water that fell, instead of being absorbed, would go into the Lea?—Yes. Practically, however, the friction of the water in the chalk is so enormous that I do not think the quantity abstracted by the Company would make a difference of 1000 gallons a day.

Mr. *M. W. Hervey*, for the past ten years Engineer to the West Middlesex Water Company, examined by the Chairman, said the water the Company had pumped this year through their works at Hammersmith was: June, 23,124,933 gallons; July, 23,917,011 gallons; August, 22,870,405 gallons; September, 23,504,445 gallons; and October, 21,372,666 gallons. This was sufficient to supply all the wants of their district. The sole source of the Company was the Thames, from which they were authorized to draw 24½ million gallons daily. In the months

mentioned, they had therefore to spare daily: In June, 1,375,067 gallons; July, 582,989 gallons; August, 1,629,595 gallons; September, 995,555 gallons; and in October, 3,127,324 gallons. The first set of figures were considerably in excess of the corresponding ones for 1887. The pumping capacity of the Company was ample. They had finished four additional filters this year; bringing up their filter area to 19 acres, which could easily treat from 33 to 35 million gallons daily. The pumping power was also ample. The Company could pump into their district about 33 million gallons a day; but there would be little spare power then, so that this would hardly be safe. Moreover, the quantity would be restricted by the mains. He should think 5 million gallons a day would be the maximum quantity they could at present supply to an outside Company. In the summer months, it would be much smaller—about 1½ million gallons. The total storage of the Company was 397,500,000 gallons. A supply of 1½ million gallons daily during the four months would total 183 million gallons; and supposing the spare water of the Company to amount to 139,708,764 gallons, they would have to draw the balance of 43,291,236 gallons from store, which would leave 354,208,764 gallons. This, less water used for sand washing, &c., at Barnes during the four months (56,705,000 gallons), would reduce the storage to 297,503,764 gallons, which at an average consumption of 22 million gallons a day, equalled 13·5 days' supply. His Company, however, were going to Parliament next session for power to take 5 million gallons of water a day more, pending the completion of the Staines scheme. He considered this quantity absolutely necessary to meet their wants. It would give the Company a margin to fill up the storage reservoirs quickly.

Sir G. Bruce: If it is thought desirable that all the Companies should in some way be coupled up, do you think scheme No. 2 is a good one?

Witness: I think it is the best that could be devised.

Major-General Scott: And you approve of coupling up?

Witness: Yes.

Do you think it is worth while to spend half a million to do it?—I think this sum might be modified.

Is it worth while, considering the benefits which might be derived from it?—It is a very large expense, no doubt.

Are you distinctly in favour of it?—As an assurance, yes; but for possible failure, as it has not occurred in the past, I do not see any necessity for it occurring in the future.

By the Chairman: He thought his Company could spare the 1½ million gallons a day next year, but certainly not after that. Practically his Company's power of contributing 1½ million gallons a day to this inter-communication stock, except for next year, depended on them getting their forthcoming Bill.

By Sir J. Dorington: He thought the main passing water from the Grand Junction, West Middlesex, and New River Companies would also be available to return water to (say) the West Middlesex Company in case of necessity.

The Chairman: If scheme No. 3 establishes a means of communication all round the circle, the supply of each Company could travel that way, and meet any want that arose?

Witness: I think it would be sufficient to meet any case; but not to the extent No. 2 would, because we depend on the amount of water each individual Company has to spare at the time. Scheme No. 2 I think does not, because you would be able to pump the water direct from Hampton to Battersea; and there you would have the means of distributing 15 million gallons a day to whoever required it.

Mr. *Richard Hack*, Chief Engineer to the Chelsea Water Company, said that his Company had power to take from the Thames 22 million gallons daily at West Molesey. The Company pumped on an average every day during 1898 12,283,789 gallons. The daily average for June was 12,358,000 gallons; July, 13,225,000 gallons; August, 12,530,000 gallons; and September, 12,673,000 gallons. On the annual average, therefore, they had pumping powers for about an extra 10 million gallons. They had sufficient plant and mains to deliver the whole 22 million gallons to the filtering area at Surbiton; and in twelve months' time they could put up sufficient filtering plant to deal with this quantity. At present, they could filter 5 million gallons more than their daily requirements. The only contribution, therefore, they could make to the inter-communication scheme would be about 5 million gallons a day. On the average of the four months mentioned, they could have afforded 2 million gallons—perhaps 3 millions. The pressure of the Chelsea water at the point of connection was superior in the day, and inferior in the night, to that of the Southwark and Vauxhall Company; so that the supply would have to be given when the pressure of the latter Company had been reduced. The period of supply, therefore, would be limited to about half the 24 hours; and practically all the Chelsea Company could contribute would be 3 million gallons a day. His Company did not want the inter-communication scheme for themselves; but they thought it was desirable in case of a breakdown of mains.

Mr. *Ernest Collins*, Distributing Engineer to the New River Company, was then re-called for the purpose of formally handing in a statement of scheme No. 2, which the Chairman had already dealt with at length. The Chelsea Company were left out of the scheme except as a receiving Company; witness understanding from Mr. Hack that the greatest quantity they could give in time of drought was 2 million gallons a day. If they had water to spare, a connection so as to take it from them could easily be made.

Mr. Pember said all the Directors of the Companies approved of the scheme.

Sir J. Dorington: How is this scheme superior to scheme No. 3?

Witness: I do not think that scheme was put forward as a definite one. Sir Henry Knight said there were certain connections which were sufficient for certain purposes, and they have answered; but they were not made for inter-communication. For instance, we laid a main along Oxford Street to connect the Grand Junction Company with the New River head; but we do not look upon it as permanent. Though it may answer for a short time, it is a connection that we do not like. Scheme No. 3 was part of scheme No. 2.

Mr. *W. Morris*, Chief Engineer to the Kent Water Company, said his Company approved generally of scheme No. 2. With existing plant, the Kent Water Company could contribute 2 million gallons daily to an inter-communication scheme. During the summer just passed, the Company had pumped their wells nearly to their utmost capacity, having had an accident at one, the loss from which they had had to make good at different stations. In June, the daily quantity pumped was 17,003,000 gallons; July, 17,907,000 gallons; August, 18,686,000 gallons; September, 18,791,000 gallons; and October, 16,523,000 gallons. These figures included the quantity passed through the Blackwall Tunnel. He had a slight objection to scheme No. 2, inasmuch as it did not provide for giving the Kent Company more than 2 million gallons a day in case of unforeseen emergency. Witness handed in a rainfall table for the last 86 years in the Kent Company's district, from which it appeared that the lowest average of ten years was 23·4 inches in 1855-64. None were below 17 inches, until this last year, when the rainfall fell to 12·77 inches.

By Mr. Balfour Browne: The maximum capacity of the pumps for one day was 25 million gallons, and the maximum quantity pumped was 21 million gallons; so that they had a margin of about 4 million gallons for safety.

Mr. *Joseph Francis*, Engineer to the New River Company, examined by the Chairman, said he was in charge of the wells of the Company in the northern part of the system. The average quantity of water pumped this year would probably be about 2 million gallons daily above the highest year in the past. None of the wells were situated very near the Lea. To a small extent, the water oozed from the chalk into the Lea. The wells were fed by whatever water was contained in the chalk formation, which to a very small extent in some places supplied water to the Lea. The Lea this year had been lower than he had ever known it before. There had been a deficiency in the higher sources. There was no connection between the pumping from the wells and the deficiency; the effect of the pumping being purely local. The water fell on the high chalk, and sank into the ground; and as it passed towards the wells and the Thames, it naturally fell below the level of the outflow of the springs that formed the sources of the Lea. There was no evidence whatever to show that the pumping had any effect upon the yield of the Lea. All the springs in the open chalk had yielded as well this year as any other, with the qualification that in a dry season, or a series of dry seasons, the pumping level was slightly lower than in a wet year; but this had no effect on the water obtained. The Chadwell spring failed this year; but this did not really affect the Company's resources, because it was not counted on in a dry season. It would yield some 3 million gallons daily in wet years.

The Chairman: Do you consider that, even if the drought of this summer is repeated, you will be able to go on furnishing 6 million gallons a day to other Companies?

Witness: I do not see why we should not. But we must, of course, provide for our own consumers first.

Major-General Scott: At what daily rate is your supply increasing year by year?

Witness: About a million gallons a day. I think that is a very full estimate.

By Lord R. Cecil: The Chadwell spring had now fallen lower than ever before. For years, the Company had been increasing their pumping from wells; so that now they were pumping more than in 1892, and still more than before that date.

Mr. Claude Baggallay: Do you find when you are pumping from one well that it seriously affects any other?

Witness: No, certainly not.

Sir *Alexander Binnie* was then placed in the box, in response to a suggestion that the London County Council might like to call evidence on the particular subject being inquired into—viz., inter-communication. Examined by the Chairman, he said he considered scheme No. 2 under existing circumstances unnecessary.

The Chairman: Then you are in favour of scheme No. 3?

Witness: Practically it would come to that.

You think it is not worth while to establish inter-communication so as to guard against accident or breakdown on the part of other Companies?—Hardly so. It very much depends on what is going to happen in the future. I regard the spending of half a million in this particular way as money very much wasted, if the Companies are to be purchased.

Why so? Would not a purchaser at once couple up all these concerns, so as to practically make them one?—In a different way. Suppose the County Council were to purchase the whole of the Companies to-morrow, and they were all in one hand, the water would come in in the future not from the Thames Valley, but from northwards.

But there would still be 185 million gallons coming in from the Thames?—Yes.

By northwards, do you mean from Wales?—Yes, the Elstree reservoir; and I should not like to see it complicated by this central communication. I agree that No. 1 scheme is a good one; and, putting aside for the moment the drought of this year, something of the kind will have to be done for the future. I do not think it would be conducive to the general interest to make all the communications with Battersea, which might never be used at all.

Supposing the Companies unite, they would be used constantly?—With deference, I think scheme No. 1 would be more workable than No. 2 in case of amalgamation. I think the difficulty of getting over next year, and probably the year after, is met by what has already been done.

Major-General Scott: After that?

Witness: After the next two or three years—well, we must suspend our judgment until we learn what the Companies are going to do in Parliament. We hear that the East London and West Middlesex Companies are going to Parliament. I am looking at the matter from the limited point of view of how we are to deal with the case of the East London Company next year or the year after.

Do you think that in two years the East London Company will be independent of all these connections?—I think not.

The Chairman: Supposing all the Companies were bought next year, the East London Company will want more water?

Witness: Probably. We know the Thames Companies have power to draw 150½ million gallons a day, and they draw as a maximum 136 million gallons; so there are 14 million gallons available from the Thames. We know there are 6 million gallons from the New River. That is 20 millions from these two sources to meet the possible bad case of next year.

Mr. De Bock Porter: What has already been done would allow this water to be distributed?

Witness: With the addition of the mains spoken of by Sir Henry Knight. This would increase the 6 million gallons to 10 millions through the Tower Subway. This would make the scheme adequate for the East London Company; and all the Engineers have told us that they do not anticipate difficulty in their own districts. If we are going into the question of inter-communication of pipes generally, the whole system ought to be worked out in a different way—not from the centre outwards, but from outwards to the centre.

The Chairman: You, in fact, differ from almost all these eight Engineers, who prefer scheme No. 2 to No. 1?

Witness: I do. I am looking at it from the point of view of amalgamation in one hand.

If the County Council were the purchaser of the eight Companies next year, would you recommend scheme No. 1?—Yes. The immediate necessities of the case would be met by laying the main which would allow the Nunhead reservoir to give increased pressure to the Tower Subway.

You would meet only the possible, and indeed, probable, failure of the East London Company next year, and nothing else?—Yes, for the present; but in a few years I should adopt scheme No. 1.

Witness, in answer to further questions, said he could hardly state that he represented the views of the County Council, because they had not had time to see the evidence of the last few days. But, as a matter of fact, he believed the views he had expressed were generally those of the Council. The Council, he thought, would feel very much aggrieved if an expenditure of half a million were put upon the Companies at this stage, after hearing the evidence the Chairman had had.

The Chairman: I cannot help saying that the adoption of scheme No. 2, though it will increase the debenture debt, will diminish the selling value of the Companies.

Mr. Balfour Browne: I am not at all sure of that.

The Chairman: There is a dead outlay of capital, with no possible recoupment.

Mr. Balfour Browne: Oh, yes there is, because if the East London Company were bought to-day, it would be bought as a defaulting Company; but after this scheme, it would be bought as a Company that has the water and could supply it.

Witness (continuing) said, as regarded the East London Company, he thought that what had been done by the Companies in the last month or two was practically sufficient to meet the crisis not only for the present, but for next year also; and Mr. Bryan agreed with him. He believed any large scheme of coupling up would be prejudicial to a possible purchaser. He was thinking rather of the way the hands of a purchaser would be tied by having a concern with pipes like these, which would not be used. Connections might be formed on the lines of No. 1, where the connections would be less expensive and more likely to be used. He went on to point out that it was intended by the New River Company to lay a pipe which was to be of much larger size than was required to bring their share of the water under the Staines scheme. This pipe crossed the East London mains at Sunbury; it passed close to one of the Grand Junction mains at Hounslow; it crossed the West Middlesex mains near Kilburn; and so on—there being other connections of an advantageous kind to the whole of the Companies.

The Chairman: It seems to me that your criticism depends on this—that you are looking forward to a supply from Wales, and you would mould your whole inter-communication system so as to benefit and enable you to inter-communicate that?

Witness: That is one thing; and I am looking also to the possibility of all the Companies being worked from one centre by one common authority.

By Mr. Littler: He proposed to utilize the 10 million gallons from the Southwark and Vauxhall Company, by passing it on to Battersea, Nunhead, and Brixton, and so through the Tower Subway to the East London district; but this could not be done under scheme No. 1.

This concluded the evidence on the question of inter-communication.

Mr. Balfour Browne then suggested that perhaps the Chairman would like to hear him in criticism of the scheme favoured by the Companies.

The Chairman, after consulting with his colleagues, said they did not desire to hear Counsel. The proceedings were then adjourned till to-day; it being understood that the Committee would meet yesterday to consider their report on the subject.

THE DERWENT WATER SCHEME OF THE LEICESTER CORPORATION.

The report of the Water Committee of the Leicester Corporation on the new water scheme for the borough has been published. It is a voluminous document, and will be submitted to a special meeting of the Town Council to-day. At the outset it shows that the experts consulted (Mr. J. B. Everard, Mr. R. E. Middleton, and Mr. G. F. Deacon) do not adopt quite the same view that the late Mr. Thomas Hawksley did as to the quantity of water available for the borough under the works now in operation. The yield from the rainfall in the gathering-grounds of Thornton, Bradgate, and Swithland is not regarded as so large as previously believed—a greater percentage being allowed for evaporation and other contingencies. Hence the necessity for looking out at once for further supplies, which will be needed, at the latest, in ten or twelve years' time. It is next shown that there are no other sources available in the county likely to yield water of the quality required, and which would be commensurate with the expense incurred. Consequently it is proposed to utilize the waters of the Upper Derwent, impound them in three reservoirs, the first of which would be constructed near to Ashopton, and convey them to Leicester by conduits and pipes—a distance of about 70 miles. It is recognized that Derby and Derbyshire have a claim upon the waters; and provision is made in the Bill either for the supply of Derby and other places *en route*, upon terms to be arranged, or for a joint scheme with the Derby Corporation—what is known as the Birmingham clause also being adopted. The financial part of the report is of considerable importance. The construction of the first reservoir and the other works necessary to carry the water *viâ* Ambergate to Leicester is estimated to cost in round figures one-and-a-half millions. The other reservoirs, of course, would only be made as the necessities of the borough demanded. It is suggested that the profits now made by the Water Department should be funded from this year; and if this be done, by the time the new works were constructed, it is anticipated there would be a sum in hand equal in round figures to £178,000. By that time, also, the rateable value of the town would have increased, and likewise the revenue from the department; so that, with the help of the funded profits, the call upon the rates will be comparatively small, and diminishing with the growth of the demand for water for domestic and manufacturing purposes. Suggestions for the appropriation of some of the water of Blackbrook by arrangement with the Corporation of Loughborough, are shown to be inadequate and costly, considering the volume that would be available; and finally the report deals with the quality of the Derwent water, and demonstrates that the fears locally urged that it might produce goitre or "Derbyshire neck" are groundless. The undertaking is the largest that the Leicester Corporation have ever had to consider, involving a total outlay of several millions, spread over fifty years. The Water Committee have officially approached the Derby Town Council with proposals for a joint scheme, but so far without success.

The conclusions and recommendations of the Water Committee are as follows: After giving the whole matter their most anxious consideration, the Committee have arrived at the decided conviction that it is for the best interests of Leicester that the Derwent and Ashop Valley scheme should be adopted, and every effort made to secure the necessary parliamentary powers. The Committee are deeply impressed with the necessity of at once taking steps to submit a Bill for the necessary powers to Parliament in the next session; and they have therefore authorized the Town Clerk to insert the necessary parliamentary notices. The Committee recommend the Council to approve the above scheme, and to authorize them to take all necessary proceedings for the promotion of a Bill in Parliament, and to do all acts consequent thereon, including the entering into provisional agreements for the purchase of land and easements and as to any other matters, and for the employment of such professional and other assistance as may be necessary or desirable, and to affix the common seal of the borough to all documents.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Notices of Parliamentary Bills are coming out at present. The only one relating to gas supply which I have yet seen is by the Dundee Gas Commissioners, which, by the way, is a name I thought had been lost since the Town Council took over the entire management of the gas undertaking; but I must have been mistaken. The purpose of the Bill is to empower the Commissioners to discontinue and remove portions of their existing gas-works, and to erect and maintain new gasholders, purifying apparatus, and other gas-works and gas apparatus, on the lands belonging to the Commissioners, on which the existing gas-works and gas apparatus of the Commissioners stand; being those lands lying within the Parish of Dundee. Power is also asked to borrow money for the purpose, on the security of the existing works of the Commissioners, and of the rates and charges which they are authorized to levy. The Commissioners also wish to have conferred upon them the powers of the Electric Lighting and other Acts. The Bill is an *omnibus* one; and it further asks for an extension of the burgh boundaries.

Among the notices of Parliamentary Bills which are appearing, is one relating to an extraordinary measure for the utilization of water power in Scotland for the generation of electricity. People who have been to Switzerland have come back fired with the idea that, as in that country, the mountains might be made to pay for their keep, so to speak, by making the water which flows down their sides do useful work. A company, or syndicate, has been formed, the *personnel* of which is not yet disclosed, with this object in view in Scotland. The proposal is to impound the water in Loch Ericht and other streams and lochs in Perth and Inverness shires, and to convey it, by aqueducts and tunnels, a distance of 20 miles, to Loch Leven, above Ballachulish, where a fall of upwards of 1100 feet can be obtained. The anticipation is that about 38,000-horse power will be derived. The scheme has only one chance of passing—that is, if its promoters are persons of great influence, such as were those who promoted the Foyers Syndicate. On the other hand, there are various reasons why it should fail. Without going into them all, it may be said that the heaviest obstacle will be found in the fact that the scheme requires the diversion of the water of Loch Ericht, and of one stream, from the River Tay to the west coast; and this involves the payment of compensation to everyone who possesses a right to fish in the Tay from its source to the sea, and in all its tributaries and feeding lochs. An enormous capital would thus be required. One of the reasons which are given for the proposed scheme, is that sea carriage will be secured to the works. That would be very important, if it were the case; but in this instance it is one of the weaknesses of the business, as only vessels of 14 feet draught could be employed. The probabilities are that, whatever may become of the proposal in Parliament, the works will never be started. It doubtless is the case that there is much valuable power running to waste; but a less ambitious scheme would serve to show whether it could be profitably employed, and how to do it.

The failure of the electric light in Edinburgh, to which I referred last week, led to the issue, last Saturday, of the following appeal to consumers, on behalf of the Electric Light Committee: "Sir or Madam,—We respectfully and earnestly appeal to you, in the present unfortunate crisis in the electric lighting undertaking of Edinburgh, hitherto so successful. Relying on promises of plant delivery, which were not fulfilled, new consumers were connected up in large numbers during summer and autumn; and we are now unable to deliver current at the standard pressure during the hours of heaviest load, from 4 to 7 p.m. The consumers can help us in this difficulty by arranging to light only two-thirds of the lamps usually required during the above hours. If this is done, more light will be got from the remaining lamps than if they were all on, as the full pressure can be maintained. If the switches do not suit, the necessary lamps can be unshipped. As soon as we can get the plant in sufficient order, due intimation will be given. We trust to your complying with this

request, assuring you that every effort is being made to put the plant in a more satisfactory condition, and with the least possible delay." This is not quite dignified; but necessity required that something should be done. Such an incident was certain to be the occasion of complaint, and letters to the newspapers were bound to be in evidence. On this matter, it is singular that these "voices of the people" should not have been able to get their grievances aired in the Edinburgh Press, but had to betake themselves to Glasgow. The letters give, as one of the reasons for the failure of the light, an alleged defect in the works, which has never been suspected, and which I do not altogether accept. One writer says: "The deficiency in regard to light is attributed to delay in delivery of plant, &c., necessary to meet the increased demand for current. In a measure, this is perhaps correct. At the same time, it would be interesting to know the meaning of the extempore iron chimney with forced draught arrangement which within the last few days has made its appearance at the east entrance to the Corporation lighting station." Then another correspondent says: "'Lamplighter' is quite right in drawing attention to the iron chimney. The fact is that the Corporation have more boilers and engines and dynamos in their building at Dewar Place than they can get to work, for the simple reason that a great blunder was perpetrated in the first instance in making their chimney-stalk quite inadequate to the requirements of their engine and boiler room space. In addition to this, the flues are all too small; the result being that there is no draught for the boiler-fires, and, as is usual in such cases, it is found that the lighting of more boilers reduces the quantity of steam produced instead of increasing it—hence the additional iron chimney. The delay in the delivery of any plant ordered—barring the said iron chimney—has therefore nothing to do with the failure of the electric lighting; and it is rather ungenerous to send round such a circular blaming the contractors for non-delivery of plant. This Club (the Conservative) has been in semi-darkness for some weeks now; the voltage having fallen on several occasions as low as 190, instead of 230."

On Monday night the Royal Scottish Society of Arts held their annual general meeting, in Edinburgh. The President (Mr. Andrew Beatson Bell) delivered an opening address, the greater part of which was devoted to subjects relating to gas lighting. This course was adopted chiefly because the two leading papers before the Society last winter were on gas supply subjects. Mr. Bell narrated a short history of gas manufacture, from the days of William Murdoch, and went on to comment upon the fact that, alongside of a large demand for electricity for lighting purposes, the consumption of gas was not receding, but was advancing by leaps and bounds. All this is known to everyone who is conversant with gas matters. But it is not so well known by the general public; and the more widely circulated the information is the better.

The work of telescoping a gasholder for the Broughty Ferry Gas Commission having been completed by the Contractors (the Barrowfield Iron-Works, Limited), the ceremony of turning on the gas was performed by Provost Gray, of the burgh, last Wednesday. At a luncheon which was held afterwards, Mr. Christie, the Convener of the Works Committee, speaking of illuminants, pointed out that the invention of the incandescent gas-burner was a most formidable opponent to the electric light. Gas, he said, was, so far as the lighting of the burgh was concerned, cheaper than electricity. An estimate for the electric lighting of Brook Street had been obtained, and it amounted to £320; whereas they could light the whole burgh with gas for £265. Of course, with electricity there would be a greater illumination; but the difference in cost fully warranted an adherence to gas. It was necessary that they should increase the storage capacity at the gas-works. In 1870, when the burgh acquired the undertaking, the sale of gas was 8¼ million cubic feet; in 1880, it was 17 millions; in 1890, 25 millions; and now 37 millions. In 1894, immediately before the erection of the holder which had just been telescoped, the storage accommodation at the works was 94,000 cubic feet; after that, it was 150,000 cubic feet; and it was now 220,000 cubic feet. The maximum winter day's make in 1884 was 140,700 cubic feet; and for this winter it might be taken at 216,000 cubic feet. These figures showed that the productive capacity of the works had had to be attended to in recent years. The cost of telescoping the holder would be about £1700. If they had adopted another scheme which was considered, the cost would have been at least £9000. They had therefore effected a saving in capital expenditure of £7300, the interest upon which, at 3 per cent., and sinking fund at 2¾ per cent., meant an annual saving of £420. Besides this, the ground which would have been required by the larger scheme had been left untouched, and would be available for further extensions. It is evident from all this that the gas-works at Broughty Ferry are well engineered by Mr. A. Waddell.

The Turriff Gaslight Company held their annual meeting on Monday. A dividend at the rate of 5 per cent. was paid, and the charge for gas was continued at 7s. 6d. per 1000 cubic feet. This price is surely higher than it need be. It was reported that the works are in a satisfactory condition, and that the leakage is 2 per cent. less than it was in the preceding year.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Nov.* 19.

Sulphate of Ammonia.—The market has been quiet all through the week; and the closing quotations are £10 to £10 1s. 3d. per ton, delivered f.o.b. at the ports. Makers, having availed themselves of the recent advance to dispose of their current production, have been in no hurry in regard to further sales; so that, although there has been smaller demand, prices have been fairly well maintained. Speculative buying seems to have stopped; and the bulk of the week's business has been done by consumers. In the forward position, makers have been firm; and their quotations remain £10 5s. per ton, ordinary terms, f.o.b. Leith, January-June delivery; and for London, Beckton terms, £10 per ton, delivery over the same period. Within the past few days, there has again appeared speculative offering abroad at a discount on spot prices, delivery over near months; but buyers have not responded very freely.

Nitrate of Soda is unchanged; the quotations for ordinary being 7s. 6d. per cwt., and for fine quality 7s. 7½d. on spot.

LONDON, Nov. 19.

Tar Products.—The high prices being paid for tar is causing much comment, especially having regard to the fact that the leading products have so largely decreased in value. Speculative purchases are doubtless made in the hope that some improvement will soon come to the trade. Benzols are quoted weaker, although a provincial sale is reported at a price above the quotation made herewith. There is no change in the value of pitch, although business is brisk, owing to shipments and the improved value of fuel.

Average values may be taken at: Tar, 14s. 6d. to 20s. Pitch, east coast, 25s.; west coast, 22s. Benzols, 90's, 8½d.; 50's, 8½d. Toluol, 1s. Solvent naphtha, 1s. 2d. Heavy naphtha, 1s. 1½d. Crude, 30 per cent., naphtha, 3½d. Creosote, 3d. Heavy oils, 45s. Carbolic acid, 60's, 1s. 11d. Creosote salts, 30s. Anthracene, nominal, "A," 4d.; "B," 3d.

Sulphate of Ammonia continues to show a firm market; and prices in all positions may be taken at £10 2s. 6d. per ton, less 3½ per cent.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The position continues strong in the coal trade here; and now that there is no immediate prospect of the wages question being raised, the outlook is somewhat more settled. The better qualities of round coal are moving off rather more readily; but the demand is still not up to the average for the time of the year, and collieries working five days per week are turning out sufficient to meet present requirements. Prices, however, are firm at the full list rates. Common round coals are in much the same active request as reported of late, so far as inland requirements are concerned; and though there is no scarcity of supplies, prices are exceedingly firm at from 7s. 9d. per ton at the pit for medium, up to 8s. 6d. for the best qualities of steam coal. For engine fuel, there is also a continued brisk demand, with a good deal of inquiry for forward contracts; and the tendency of prices continues in a hardening direction—from 8d. to 10d. per ton over last year's contracts being obtained in many cases for the better qualities of slack. At the pit, common sorts average 3s. 6d. per ton; good medium, 4s. to 4s. 6d., and best qualities, 5s. to 5s. 6d. The shipping trade is moderate; but vessels are scarce, and with higher freights business is restricted. Prices are perhaps a shade easier; 9s. to 9s. 3d. per ton representing average figures for good ordinary steam coal delivered at the Mersey ports.

Northern Coal Trade.—There has been an increased demand for both steam and gas coals in the last few days; and with fuller work at most collieries, prices are decidedly firmer. Best Northumbrian steam coals are quoted at 9s. 6d. per ton f.o.b.; second-class steam, 8s. 9d.; and steam smalls, about 5s. 6d. Gas coals are now at about the period of the fullest demand; so that the chief collieries have little of their output to sell. For occasional cargoes, the quotation is from 9s. to 9s. 4d. per ton f.o.b. Gas coke sells rather more freely for household use; and the price is maintained. The output is now very heavy; and stocks are increasing at some of the inland works.

Scotch Coal Trade.—Reports to hand show that the demand is improving everywhere except in Fife, where the Baltic season has closed somewhat disappointingly. In the West, freights having fallen slightly, more coal has been got away. This has relieved railway waggons, which were standing full awaiting shipment, and has enabled work to proceed at the collieries. Splint is reported to be fully contracted for till the end of the year. The prices quoted are: Main, 8s. per ton f.o.b. Glasgow; ell, 8s. 6d. to 8s. 9d.; and splint, 8s. 9d. to 9s. The shipments during the week amounted to 165,694 tons—an increase of 11,188 tons over the preceding week, but a decrease of 4347 tons upon the corresponding week of last year. For the year to date, the total shipments have been 8,518,272 tons—an increase on the same period last year of 1,426,711 tons.

Accident to a Reservoir.—Last Wednesday evening, a recently completed reservoir belonging to the Tendring Hundred Water Company at Dovercourt, collapsed, some of the bottom plates giving way. About 200,000 gallons of water were wasted, and flooded the adjacent land; but no further damage is reported.

Issue of Additional Metropolitan Water Stock.—As will be seen by an announcement which appears elsewhere, the East London Water Company are inviting tenders for £150,000 of 3 per cent. debenture stock, created under their Act of 1897. We learn that the Lambeth Water Company are also offering for tender £100,000 of stock of similar nominal value. Both stocks will be redeemable after 25 years on six months' notice.

Market Harborough Gas-Works Purchase Question.—A discussion of some length took place last Tuesday at the meeting of the Market Harborough District Council on a report of the General Committee, which set forth the steps taken in the negotiations with the Gas Company for the purchase of their undertaking. At the request of the Committee, Mr. Corbet Woodall had fully considered the whole matter, and had submitted his views thereon. The profits of the Company for each of the past two years were above £1600; and, taking this into consideration and the probable cost of arbitration, the Committee recommended the Council to offer £38,000 for the works, plant, &c.—the date of the transfer to be settled by a Joint Committee. The report was adopted.

Sales of Shares.—At the Mart, Tokenhouse Yard, E.C., last Tuesday, Mr. Alfred Richards sold some £100 shares in the New River Company at £435 to £439 each. On the same occasion, some fully paid £10 shares in the Lea Bridge Gas Company fetched £26 per share; some £5 shares in the Romford Gas Company, £10 each; and 5 per cent. preference stock of the Enfield Gas Company, £132 per £100 of stock. The biddings were less keen than at recent sales conducted by Mr. Richards. On Thursday, Messrs. Day and Sons disposed of some stocks and shares in the Maidstone Gas and Water Companies. Twenty £100 lots of consolidated stock of the Gas Company were offered. The first lot realized £253, seven fetched £252, and the remainder £251 per lot. One lot of £50 stock of the Company was sold for £125 10s.; but 35 similar lots changed hands at £125. A single lot of £24 stock realized £62. Some £100 lots of 3 per cent. debenture stock were disposed of at less than par value; the prices ranging from £97 to £93. Thirty £10 preference shares (5 per cent.) in the Maidstone Water Company fetched from £13 to £13 10s. per share; six £10 4 per cent. preference shares, £11 each; ten £10 original (10 per cent.) shares, £25 per share; ten £10 ordinary (10 per cent.) shares, £22 10s. per share; and some 7 per cent. ordinary shares, £16 to £16 10s. apiece.

The Ramsgate Corporation and the Minster Gas-Works.—The Directors of the Minster Gas Company, after consulting the shareholders, have decided to accept the final offer of the Ramsgate Corporation to purchase the Company's undertaking for £2500.

The Shelf (Yorks.) District Council and the Water-Works.—The Shelf Water Company, at a special general meeting recently held, decided to sell their undertaking to the District Council for £2750, *plus* the cost of transfer. The paid-up capital is £1500 on 3000 shares; so that the price offered represents about 83½ per cent. thereon.

A Victim of Acetylene.—A tinman in the town of Papenburg, in the fen district of Prussia, has recently been killed on the spot by an explosion which resulted when he proceeded to examine an acetylene service with a naked light. He is reported to have made the generating apparatus furnishing the gas which exploded, though he was without any technical knowledge of acetylene.

The Newhaven and Seaford Local Authorities and the Water-Works.—At a recent special meeting of the Newhaven Urban District Council, it was unanimously resolved to unite with the Seaford Urban District Council for the purpose of obtaining powers to enable them to obtain, by compulsion or otherwise, the control of the undertaking and property of the Newhaven and Seaford Water Company.

A Water Scheme for Fletching.—A scheme of water supply is to be carried out for the village of Fletching, near Uckfield. A well from 12 to 15 feet deep is to be sunk near Fletching Mill, fitted with a pump capable of raising 3500 gallons per hour into a reservoir about 1100 yards distant; 4-inch pipes being used for the purpose of conveying the water. Four or more stand-pipes will be placed at intervals through the village, from which water may be obtained. The reservoir will have a capacity of 50,000 gallons, and will be 45 feet by 22 ft. 8 in. It will have brick sides and a concreted base. The reservoir and the ground on which it will be built, as well as the stand-pipes, Mr. Maryon-Wilson proposes to present to the Parish Council on behalf of the village. The cost of the scheme will be about £500.

Rotherham Gas Stokers' Dispute Ended.—Last Friday week the gas stokers who have been out on strike at Rotherham held a meeting to consider the report of a deputation who had sought an interview with the Sub-Committee of the Corporation Gas Committee on the previous day. The terms offered to the stokers were 5s. 7½d. per shift for the horizontal retorts, and 5s. per shift for the inclined retorts. Later in the day certain of the men waited upon the Engineer at the works, and offered their services upon the stipulated terms. Some of these men will be reinstated as soon as arrangements can be made; and the others will no doubt later on find employment in their old occupation. One condition of the arrangement is that the men must sign an agreement; and they have consented to do so.

Gas-Works Extensions at Chesterfield.—About two-and-a-half years have elapsed since the gas and water works of Chesterfield were taken over by the present Board from the old Company. Shortly after becoming possessed of the concern, the Board decided to reduce the price of gas—a step which quickly led to an enormously increased demand. The producing capacity of the plant was about 350,000 cubic feet per day; and it soon became apparent that the demand would, in a short period, exceed the supply. The Board therefore decided, some months ago, to put down new plant adequate to meet the growing needs of the district for some years to come. A large skeleton building, erected by the old Company some time before the concern was transferred, has accordingly been altered to accommodate an installation of inclined retorts, with a maximum producing capacity of 750,000 cubic feet of gas per day. The construction of the retort-settings has just been completed; and it is intended, when all the new retorts are in operation, to dispense with the old plant.

Fatal Gas Explosion in Paris.—A terrible explosion, which killed two persons and wounded seven others, occurred at about half-past five o'clock on Sunday evening last at the Restaurant Champeaux, in the Place de la Bourse, Paris. It took place in the cellar, and such was its violence that all the plate-glass windows of the establishment were shattered, the flooring of the restaurant was destroyed, and the iron door of the cellar was blown into the street, where it killed an old woman who supplied the establishment with newspapers. She had been chatting on the foot pavement in front of the restaurant with the knife-cleaner, who was mortally wounded, and who died while being carried to the hospital. The seven persons injured comprise one cellarman, four of the cooks, and two of their friends. The explosion is reported to have been caused by the cellarman, who had entered the cellar with a lighted candle. Being questioned as to how the accident occurred, he could only say that all he knew was that after entering the cellar he suddenly found himself back in the hall with a broken leg and burns all over his body. The Prefect of Police, the Police Commissary of the district, and numerous other officials were soon on the spot, and commenced an inquiry.

Chard Water Supply.—The Local Government Board have refused to sanction the proposal of the Chard Town Council, to which reference was made in the "JOURNAL" for the 4th ult. (p. 772), to borrow £2500 for purposes of water supply. In communicating their decision to the Corporation, the Board say they gathered from their Inspector that the two springs from which the supply is obtained are liable to serious contamination from their surroundings, and that one of them is actually polluted by the soakings from a stable. It also appears to have been admitted by the Town Council that a proper supply of water is wanted for the whole of the borough. Under these circumstances, the Board say they are not prepared to assent to the borrowing of money for the purpose of defraying the cost of any works in connection with the water supply from the present sources; and they request the Council to take the matter into their immediate consideration with a view to the preparation and submission, without further delay, of a comprehensive scheme for providing the entire borough with an adequate supply of wholesome water from a fresh source. The decision has given satisfaction to the residents in the higher parts of the town, who opposed the application for the loan on the ground that provision should be made for a water supply to serve the whole borough, and not leave the higher parts without water.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 1153.

Issue.	Share	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.	Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.	£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 13	10½	Alliance & Dublin 10 p. c.	20½—21½	..	4 17 8	75,000	5	June 29	6	Malta & Medn., Ltd. .	4⅜—5½	..	5 14 3
100,000	10	,,	7½	Do. 7 p. c.	16—17	..	4 8 3	541,920	20	Nov. 11	5	Monte Video, Ltd. . .	13—14*	..	7 2 10
800,000	100	July 1	5	Australian 5 p. c. Db. .	105—107	..	4 13 6	617,946	Stk.	Aug. 31	9¾	Newc'tle & Gatesh'd Con.	230—240	..	4 1 3
200,000	5	Nov. 11	6	Bombay, Ltd.	6⅛—6⅜*	..	4 2 11	252,375	Stk.	Jan. 3	8½	Do. 8½ p. c. Db. Stk.	113—117	..	2 19 10
40,000	5	,,	6	Do. New, £4 paid .	4¼—4⅜*	..	5 1 1	150,000	5	May 26	8	Oriental, Ltd.	7¼—7⅝	..	5 3 3
880,000	Stk.	Aug. 12	12	Brentford Consolidated	275—280	..	4 5 9	135,000	5	,,	8	Do. New, £4 10s. pd.	6½—7	..	5 2 11
240,000	,,	,,	9	Do. New	210—215	..	4 3 9	15,000	5	,,	8	Do. do. 1879, £1 pd.	1¼—1⅜	..	4 11 5
50,000	,,	,,	5	Do. 5 p. c. Prf. . .	140—145	..	3 9 0	60,000	5	Sept. 29	7	Ottoman, Ltd.	5—5½	..	6 6 2
159,375	,,	June 10	4	Do. 4 p. c. Db. Stk.	130—135	..	2 19 3	500,000	100	June 1	6	People's Gas } 2nd M. of Chicago } Bd. .	103—108	..	5 11 1
220,000	Stk.	Sept. 15	11½	Brighton & Hove, Orig. .	263—268	..	4 5 10	848,070	10	Oct. 13	6	River Plate Ord.	⅞—9⅜	+¼	6 3 1
226,320	,,	,,	8½	Do. A. Ord. Stk. .	190—195	..	4 7 2	250,000	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	99—101	..	3 19 3
933,500	Stk.	Aug. 31	5	Bristol, 5 p. c. max. .	125—130	..	3 16 11	250,000	10	Sept. 29	10	San Paulo, Ltd. . . .	14½—15½	..	6 9 0
420,000	20	Sept. 29	10	British	49—50	—½	4 0 0	135,000	Stk.	Sept. 15	10	Sheffield A.	242—245	..	4 1 8
50,000	10	Aug. 12	11½	Bromley, Ord. 10 p. c. .	25—27	..	4 5 2	209,053	,,	,,	10	Do. B.	242—245	..	4 1 8
75,000	10	,,	8½	Do. 7 p. c. .	20—22	..	3 17 3	447,427	,,	,,	10	Do. C.	242—245	..	4 1 8
500,000	10	Oct. 13	6	Buenos Ayres (New) Ltd	9½—10	..	6 0 0	5,600,000	Stk.	Aug. 12	5⅓	South Metrop., 4 p. c Ord.	138—142	..	3 15 1
98,122	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	98—100	..	4 0 0	1,460,000	,,	July 14	3	Do. 3 p. c. Db. Stk. .	102—105	..	2 17 2
150,000	20	July 14	8½	Cagliari, Ltd.	29—30	..	5 10 0	60,000	Stk.	Aug. 31	12	Tottenham and } A. .	280—290	..	4 2 9
100,000	10	Sept. 29	7	Cape Town & Dis., Ltd.	14—15	..	4 13 4	60,000	,,	,,	9	Edmonton } B. .	200—210	..	4 5 9
50,000	50	Nov. 2	6	Do. 6 p. c. 1st Mort.	57—59	..	5 1 8	182,380	10	June 10	7	Tuscan, Ltd.	10¼—11½	..	6 1 9
550,000	Stk.	Oct 13	13⅓	Commercial Old Stock .	310—320	..	4 4 5	149,900	10	July 1	5	Do. 5 p. c. Dbs. Red. .	100—103	..	4 17 1
200,750	,,	,,	10⅔	Do. New do. . . .	247—252	..	4 3 4								
200,750	,,	June 10	4⅓	Do. 4½ p. c. Db. dc.	148—153	..	2 18 10					WATER COMPANIES.			
800,000	Stk.	June 10	16†	Continental Union, Ltd.	205—210	—2	4 15 3								
200,000	,,	,,	7†	Do. 7 p. c. Prf. .	190—195	—3	3 11 10								
51,600	Stk	Aug. 31	14	Croydon A 10 p. c. . .	305—310	..	4 10 4	746,164	Stk.	June 29	10½	Chelsea, Ord.	313—318	..	3 6 0
168,400	,,	,,	11	Do. B 7 p. c. . .	255—265	..	4 3 0	150,000	,,	,,	5	Do. 5 p. c. Prf. . . .	170—175	..	2 17 2
555,000	Stk.	Aug. 12	5½	Crystal Palace Ord. 5 p. c.	125—130	..	4 0 9	160,000	,,	,,	4½	Do. 4½ p.c. Pf. Stk., 1875	148—152	..	2 19 3
60,000	,,	,,	5	Do. 5 p. c. Prf. .	140—145	..	3 9 0	175,785	,,	Sept. 29	4½	Do. 4½ p. c. 1 b. Stk. .	155—160	..	2 16 3
486,090	10	July 28	11	European, Ltd. . . .	23—24	..	4 11 8	1,720,560	Stk.	Oct. 18	7	East London, Ord. . .	212—217	..	3 4 6
354,060	10	,,	11	Do. £7 10s. paid .	17—18	..	4 11 9	654,740	,,	June 29	4½	Do. 4½ p. c. Db. Stk.	157—160	..	2 1[illegible] 9
5,922,280	Stk.	Aug. 12	12½	Gaslight & Coke, A, Ord	286—291	..	4 4 0	390,000	,,	,,	3	Do. 3 p. c. Db. Stk..	103—105	..	2 17 2
100,000	,,	,,	4	Do. B, 4 p. c. max. .	120—125	..	3 4 0	700,000	50	June 29	7½	G'd Junct'n, 10 p. c. max.	115—118	..	3 3 7
665,000	,,	,,	10	Do. C, D, E, 10 p. c. Prf.	308—313	+1	3 3 11	310,000	Stk.	Sept. 29	4	Do. 4 p. c. Db. Stk.	138—143	..	2 15 11
30,000	,,	,,	5	Do. F, 5 p. c. Prf. .	152—157	..	3 3 8	708,000	Stk.	Aug. 12	14	Kent	365—370	..	3 15 8
60,000	,,	,,	7½	Do. G, 7½ p. c. do. .	233—238	+½	3 3 0	160,000	,,	,,	7	Do. New, 7 p. c. max. .	212—217	..	3 4 6
1,300,000	,,	,,	7	Do. H, 7 p. c. max. .	195—200	..	3 10 0	1,043,800	100	June 29	10¾†	Lambeth, 10 p. c. max. .	360—365	..	3 8 10
463,000	,,	,,	10	Do. J, 10 p. c. Prf. .	308—313	..	3 3 11	406,200	100	,,	7½	Do. 7½ p. c. max. .	258—263	..	3 4 4
476,000	,,	,,	6	Do. K, 6 p. c. Prf. .	185—190	..	3 3 2	350,000	Stk.	Sept. 29	4	Do. 4 p. c. Db. Stk.	138—143	..	2 15 11
1,061,150	,,	June 10	4	Do. 4 p. c. Db. Stk. .	131—133	..	3 0 2	500,000	100	Aug. 12	12½	New River, New Shares	430—440	—2½	3 0 2
294,850	,,	,,	4⅓	Do. 4½ p. c. do. .	148—153	..	2 18 10	1,000,000	Stk.	July 28	4	Do. 4 p. c. Db. Stk.	138—143	..	2 15 11
958,000	,,	,,	6	Do. 6 p. c. do. .	195—200	..	3 0 0	902,300	Stk.	June 29	6	Southw'k & V'xhall, Ord.	165—170	..	3 10 7
70,000	10	Nov. 11	8	Hongkong & China, Ltd.	13—14*	..	5 14 4	126,500	100	,,	6	Do. do. 7½ p. c. max. .	160—165	..	3 12 9
3,800,000	Stk.	,,	10	Imperial Continental .	217—222*	..	4 10 1	489,200	Stk.	,,	5	Do. do. 5 p. c. Prf. .	170—173	..	2 17 10
376,400	100	Aug. 2	4	Do. 4 p. c. Dbs. Red.	98—101	..	3 19 3	1,019,585	,,	Oct. 13	4	Do. 4 p. c. A Db. Stk.	118—143	..	2 15 11
473,600	Stk.	Aug. 12	3½	Do. 3½ p. c. Db. Stk. ,,	102—105	..	3 6 8	1,155,066	Stk.	June 10	10	West Middlesex . . .	158—163	..	3 6 8
560,000	100	Oct. 1	5	Met. of Mel- } 5 p. c. Db.	110—112	..	4 9 3	200,000	,,	,,	4½	Do. 4½ p. c. Db. Stk.	162—165	..	2 14 7
250,000	100	,,	4½	bourne } 4½ p.c. Db.	105—107	..	4 4 1	200,000	,,	Sept. 15	3	Do. 3 p. c. Db. Stk.	102—105	..	2 17 2

* Ex div.

† Next dividend will be at this rate.

Aldeburgh Town Council and the Water-Works.—Before taking steps to obtain compulsory powers to purchase the works of the Water Company, the Aldeburgh Town Council have empowered their Gas and Water Committee to "negotiate with the Water Company a binding agreement to sell, upon the basis of an arbitration, in the same way as if the Council had obtained a Purchase Bill; such agreement to be subject to the approval of the Local Government Board."

New Mills Water Scheme.—A meeting of the ratepayers of New Mills was held last Wednesday for the purpose of discussing the water scheme, for which it is proposed to introduce a Bill in Parliament. The Chairman of the District Council (Mr. H. Robinson) presided, and gave particulars showing that the estimated cost of the project, inclusive of £7000 for the existing works, is £39,433. The meeting was very lively, and at times disorderly; many ratepayers considering the scheme too expensive. Resolutions were not admitted, as voting papers are being distributed to ascertain the feeling of the inhabitants.

Water-Works for Southerndown.—The little seaside resort of Southerndown has long been in need of a good supply of water; and on Wednesday afternoon the first step was taken towards satisfying this want. Nearly two years ago several gentlemen interested in the future development of Southerndown took the matter in hand. A Company was formed, and arrangements were made with the Bridgend Gas and Water Company to deliver water from the springs at Schwyl through a 6-inch main into a storage reservoir holding about 150,000 gallons. The water will be delivered by gravitation from the reservoir into Southerndown by a 4-inch pipe nearly 1½ miles in length. St. Bride's Major and the neighbouring hamlets, all of which are now badly off for water, can be supplied from this source. The contract for the undertaking has been entrusted to Messrs. Barnes and Chaplin, of Cardiff, for about £2000; and the Engineer of the works is Mr. G. F. Lambert, of Bridgend. It is hoped that the supply of water will be ready for the spring and summer months of next year. Mr. D. T. Alexander explained the origin of the scheme, after which Miss Grace Alexander performed the ceremony of cutting the first turf; being presented by Mr. Barnes with a miniature silver spade as a memento of the occasion. Mr. C. H. Priestley, the Water Engineer at Cardiff, believes the scheme will be successful.

Stockton and Middlesbrough Water Board.—At the annual meeting of this Board yesterday week, the General Manager (Mr. D. D. Wilson) reported that the Corporations of Stockton, Middlesbrough, and Thornaby had authorized the Board to promote a Bill in Parliament for additional powers. Some discussion ensued, and several questions were asked, to which the Chairman (Alderman Hugh Bell) replied. He said that in the first year the Board took over the works, they incurred a charge on the rates of £14,000. In the following year, the loss was only £9000; and in the next, £2000. Coincident with this saving in the management, there had been a growth of the income of the Board which went to help this saving on the rates. They then set to work to provide pure water for domestic consumption. The result was that, by the time the works were finished, the charge upon the rates amounted to £30,000. This charge was lessened, not only by the improved system of management, but also by the very rapid growth of the district and the demand for water, which was entirely under the threepenny clause—the rate paid by the large manufacturing consumers. They were supplying water, it was alleged, though erroneously, at a loss, in ever increasing quantities; and yet the result was that from a charge of £30,000 on the rates it had gone down to £19,000. All he could say was that he would be very glad to go on supplying water at a loss, on the same terms. The estimated charge on the rates for the current year was £16,000. The only way by which they could liquidate the adverse balance against the rates was by going on selling water; but they could only do so by getting an additional quantity to sell.

Coal Workings and the Settlement of a Morley Corporation Reservoir.—A serious leakage of water has occurred from the Morley Corporation Victoria service reservoir at Bruntcliffe; and with the view of ascertaining the cause, Mr. G. H. Hill was consulted. His report was submitted to the Council at a meeting yesterday week. It stated that, in Mr. Hill's opinion, the leakage could not be attributed to any fault in the design, that the holes found in the puddle lining had no reference to the stepping in the foundations under the embankment, as two of the holes were in the flat portion of the lining where there was no stepping. From the leakage which had taken place since the holes discovered were made good, it was evident that other parts of the lining were defective; and from the fact that the reservoir could not be filled beyond half its depth, Mr. Hill feared that the defects in the lining were serious. He could see only two causes for the leakage—either settlement from colliery workings under or adjoining the reservoir, or bad work. Either of these would be sufficient to account for the leakage. Certain beds of coal under the reservoir had already been worked; and others were now being got. The purchase of the remaining coal under and immediately adjoining the reservoir would not ensure that no further settlement would take place; and therefore he did not recommend such purchase. All the circumstances pointed to the settlement of the ground as the cause of the leakage; and the only method he could recommend to repair the damage was to strip the pitching and earthwork from the puddle lining under the embankment, and thoroughly examine and make good all defects. Further settlement may occur, and yet the reservoir might not be damaged. If the settlement was fairly even over the whole basin of the reservoir, it would probably continue to hold water after once being made water-tight. In the course of the discussion on the report, the futility of spending more money on the reservoir was urged by some of the councillors; and Mr. Scarth moved that, having considered Mr. Hill's report, the Council were of opinion that it would be unwise to spend more money in the endeavour to make the reservoir water-tight, and instructing the Water Committee to recommend another site on which to construct a service reservoir. To this Mr. Binks moved an amendment to the effect that the Borough Engineer be requested to suggest the best method in his opinion to make the reservoir good, and to prepare an estimate of the probable cost, and submit it to the next Council meeting. Mr. Haigh, owner of the coal workings underneath the reservoir, warned the Council that coal had been got; and that it was still being, and would continue to be, worked. The amendment was, however, carried.

The "CZARINA."

Season 1898.

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Maidstone Water-Works Purchase Question.—A local paper has announced that the Maidstone Town Council have decided to meet the demand which exists among the ratepayers of the borough for more information as to the financial aspect of the water-works purchase scheme. In private meeting, the Council have also resolved to make the Company a certain offer for their undertaking, without prejudice, and to base a financial estimate thereon. The amount which the Corporation are prepared to pay for the water-works is £150,000; this sum to include compensation to officers, but not the legal expenses of the transfer. The Company are not prepared to accept this amount; the sum suggested by them, it is understood, being £180,000. There is thus a difference of £30,000 to be accommodated if any agreement as to the purchase price is to be arrived at before the poll of the town takes place.

Serious Subsidence of Land at Northwich.—An alarming subsidence of land occurred at Northwich on Tuesday afternoon. Without the slightest warning, the London main road, which, owing to the treacherous character of the land, due to the salt mining, had been built on timber, began to sink, and within an hour it was impassable. The road was fast settling, and the buildings—fully 4 feet out of the perpendicular—were kept from collapsing only by their bolts and composite frames. The area of depression extended to 40 yards; and a hole 9 feet deep appeared and was soon filled with water. The position of Mr. S. S. Mellor, the Manager of the Gas Company, in such surroundings is not an enviable one. By the recent subsidence, the water and gas pipes and the electric cable were dislocated, and the utter collapse of the buildings affected seemed to be only a question of time. The subsidence is regarded as one of the most remarkable yet experienced in the salt district.

Lambeth Water Company.—The report of the Directors of this Company for the half year ended Sept. 30 states that during this period 1940 houses and other supplies of water, estimated to yield an annual rental of £4176 were connected with the Company's works, as against 1481 houses, &c., producing a rental of £3437, laid on in the six summer months of 1897. The capital account shows an expenditure of £40,971 during the half year. The revenue account, compared with the corresponding period of 1897, exhibits an increase of £4645 in water-rents, &c., of £848 in the ordinary expenditure, and of £698 in the amount paid to the Chamberlain of London. The surplus transferred from the revenue account to the dividend and interest account is £85,597; and there is to the credit of the latter account, after payment of interest on debenture stock, an available balance of £84,229. As already mentioned (*ante*, p. 981) the Directors have decided to transfer £5000 to the contingency fund (which will then stand at £20,000), and recommend the maximum dividends of 7½ and 10 per cent. per annum, together with a payment of 5s. per cent. on all the share capital on account of deficiencies of previous dividends. There will be left a balance of £6191.

The Local Government Board and Water Diviners' Fees.—Our readers will probably remember that a few months ago the District Auditor of the Local Government Board (Mr. W. A. Casson) disallowed a sum of £13 8s. 7d. paid to Mr. Leicester Gataker, a water diviner, as fees for services rendered to the Ampthill District Council. The decision was appealed against; and it has been successful. In communicating the result to the Council, the Board said: "The Auditor disallowed the payment for reasons which, in effect, are as follows: Firstly, that Mr. Gataker's claim to be able to discover subterranean sources of water was such a pretence as constituted an indictable offence; and that, therefore, the consideration for his employment was illegal and the contract void. Secondly, that in disregarding a certain geological report and employing Mr. Gataker, the District Council incurred expenditure without any sufficient ground, and recklessly wasted the public money under their control. Thirdly, that Mr. Gataker's claim to be able to discover subterranean sources of water was practically an attempt at imposition; and that, therefore, he was not a proper person for the District Council to employ. The Auditor surcharged you with the sum disallowed on the ground that you authorized its payment; but it does not appear to the Board that his decision with respect to the disallowance and surcharge can be sustained. As regards the Auditor's first reason, the Board do not consider that it has been proved that Mr. Gataker committed an indictable offence, or that, if he did so, the members of the District Council were aware that his pretences were illegal. This being the case, the Board are of opinion that it must be held that the first reason assigned by the Auditor fails to support his decision. As regards his second reason, the Board cannot but consider the action of the District Council as unwise; but it does not appear to them, having regard to the recommendations the Council received as to Mr. Gataker's capabilities, that the Council can be considered as having acted with such recklessness that the disallowance and surcharge can be confirmed on this ground. In view of the above considerations respecting the Auditor's first and second reasons, the objection taken by him in his third reason appears to this Board to be insufficient to support his decision; and, in the circumstances, the Board propose to reverse the disallowance and surcharge. An order will shortly be issued accordingly."

Messrs. Graham, Morton, and Co., Limited, of Leeds, have issued a comprehensive catalogue of their labour-saving appliances and power-transmission machinery. The book, which contains 266 pages, is of very convenient size, and well printed.

We have received from Messrs. Fletcher, Russell, and Co., Limited, copies of their latest lists of cooking and heating apparatus and other domestic labour-saving appliances. They are got up in the tasteful style which has been a marked feature of previous productions of this character issued by the firm.

Messrs. Richmond and Co., Limited, induced the Bournemouth Gas and Water Company to fix cooking-stoves free; and they have just held a very successful exhibition in the Shaftesbury Hall in that town—taking orders for upwards of 150 cookers and six dozen gas-fires during the week's exhibition. Miss Lillie Richmond's lectures were well attended; more than 3000 people visiting the exhibition. A remarkable feature was the large attendance of lady cyclists; these being so numerous that special accommodation had to be provided for the machines, as well as attendants to look after them.

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COLCHESTER	300,000	OTTAWA (Second Contract)	250,000
BIRKENHEAD	2,250,000	BRANTFORD (Remodelled)	200,000
SWINDON (New Swindon Gas Co.).	120,000	ST. CATHERINES (Remodelled)	250,000
SALTLEY WORKS, BIRMINGHAM (Second Contract)	2,000,000	KINGSTON, PA.	125,000
WINDSOR STREET WORKS, BIRMINGHAM (Second Contract)	2,000,000	PETERBOROUGH, ONT.	250,000
HALIFAX	1,000,000	WILKESBARRE, PA.	750,000
TORONTO	250,000	ST. CATHERINES (Second Contract)	250,000
OTTAWA	250,000	BUFFALO, N.Y.	2,000,000
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		YORK	750,000
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BROTHERTON AND CO., Chemical Manufacturers.
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CANNEL, COAL, ETC.
JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, or NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

EXPORT GASGLUHLICHT GESELLSCHAFT M.B.H, BERLIN, C. 19 (LATE LILLILICHT), LARGEST MANUFACTORY IN GERMANY,
BEG to offer their Incandescent Gas-LIGHT MANTLES AND BURNERS at Lowest Quotations.
Unrivalled quality warranted.

ADVERTISER wants position in a Provincial Gas or Water Works as ASSISTANT MANAGER or ASSISTANT. Articled to Civil Engineer and Four Years' Experience in Works and Drawing Office, &c. Age 25. Holder of City and Guilds Gas Manufacture Certificate. Good References.
Apply, by letter, to No. 3164, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, one or two really good FITTERS, used to Compo. and Iron and also Service Laying.
Apply, stating Age, Experience, and Wages required, to G. HELPS, Gas-Works, NUNEATON.

WANTED, a good, useful Man as Store-KEEPER, &c. One who thoroughly understands the Gas-Fitting Trade, and who could take charge of Show-Room.
Apply to G. HELPS, Gas-Works, NUNEATON.

WANTED, a Service Layer. Must be steady and reliable. One used to Smithing preferred. Wages 28s. per week.
Apply, by letter, stating Age, with *copies* of recent Testimonials or References, to No. 3165, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Gas Company in South Wales, a GAS-FITTER and MAIN and SERVICE LAYER. Must be capable of reading Meter Indices.
Apply, by letter, stating Age, Wages, &c., to No. 3163, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ARUNDEL GAS-WORKS.
WANTED, a strong, steady, and respectable Married Man, to lay Mains and Services fix Meters and Stoves, attend to the Purifiers and Yard Work, and to make himself generally useful. Constant Employment to a suitable man. Wages 28s. per week.
Only those who have had similar experience on a Gas-Works need apply.
Apply, with References, stating Age and previous experience, to W. C. DAWSON, Manager, Gas-Works, Arundel, SUSSEX.

GWYNNE & BEALE'S
PATENT
GAS-EXHAUSTERS AND STEAM-ENGINES
FOR FULL PARTICULARS, APPLY TO THE MAKERS:
GWYNNE & CO.,

Telegrams: "GWYNNEGRAM, LONDON."

HYDRAULIC AND GAS ENGINEERS

Telephone No. 95 Holborn.

(Late Essex Street Works, Victoria Embankment, London),

BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

WANTED, a Manager for the Gas-Works, Bagnalstown, Ireland. Make about 2 millions. Must be a Fitter. Wages 25s. weekly, with free House, Gas, and Firing.
Apply, by letter, to No. 3162, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a good Gas Stoker. Used to Shovel Charging, Generator Furnaces, and Engine and Exhauster. Permanency to an active and steady Man. Wages 37s. 4d. and 32s. per six and seven day week respectively.
Address No. 3166, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS STOKERS.

WANTED, Two Strong Young Men, to commence duty next week. Must be Steady, Industrious, and used to Shovel Charging and Engine and Exhauster. Wages, 28s. per week.
Apply, personally or by letter, with recent Testimonials, to the MANAGER, GAS COMPANY, BOGNOR.
Nov. 21, 1898.

NEW SWINDON GAS COMPANY.

WANTED, a Works Foreman (age between 30 and 40). Thorough, practical experience in all the departments of Gas Manufacture required. Must possess full knowledge of Sulphate Making and Water Gas. Used to control of Workmen. Will be required to live on the Works.
Apply, stating Wages, and enclosing *copies* of not more than three Testimonials to the undersigned, not later than Saturday, the 26th inst.

JOHN J. JERVIS.
Engineer.

Gas-Works, New Swindon.

GAS AND WATER WORKS.

THE Ambleside Urban District Council require a competent MANAGER for their Gas and Water Works.
The successful candidate will be required to devote the whole of his time to the duties of his office, and to superintend the work of a Clerk who will be appointed to keep the Books and collect the Accounts.
The Salary will be £125 per annum, such sum to include everything. Neither House, Coal, nor Gas will be provided.
All applications must be made by letter to the undersigned, enclosing Testimonials, not later than the 30th inst.
Personal canvassing of the members is strictly prohibited.

GEORGE GATEY,
Clerk to the Council.

Ambleside, Nov. 10, 1898.

BOROUGH OF NEWBURY GAS UNDERTAKING.

THE Corporation of the Borough of Newbury desire the services of a MANAGER who will be required to undertake the duties of the post on the 16th of January, 1899. A Salary of £200 per year will be paid; and the person appointed will be required to devote all his time to the duties of the Office—the engagement to be determinable by Three Calendar Months' Notice on either side.
Applications, endorsed "Gas-Works Manager," stating Age, Experience, and accompanied by *copies* of not more than *three* recent Testimonials, to be sent to me, the undersigned, not later than the 3rd of December next.
Canvassing will be considered a disqualification.

F. QUEKETT LOUCH,
Town Clerk.

Newbury, November, 1898.

FOR SALE—10 Tons of Hydrocarbon. Apply STORE-KEEPER, L. & Y. Ry. Company, Osborne Street, MANCHESTER.

TO CHEMICAL MANUFACTURERS.

THE Corporation of Birkenhead are pre- pared to receive TENDERS for the purchase and removal of about 350 Tons of SPENT OXIDE OF IRON, now lying at their Gas-Works.
Forms of Tender and Samples may be obtained from Mr. T. O. Paterson, Gas Engineer, Gas-Works, Thomas Street.
Tenders, sealed and endorsed "Tender for Spent Oxide of Iron," to be sent to me not later than Five p.m., on Friday, the 9th of December, 1898.
The Corporation do not bind themselves to accept the highest or any Tender.

By order,
ALFRED GILL,
Town Clerk.

Town Hall, Birkenhead,
Nov. 18, 1898.

BRISTOL GAS COMPANY.

TENDERS FOR TAR.

THE Directors of this Company invite TENDERS for the purchase of the TAR to be produced at all or either of their three Stations during a period of One, Two, or Three Years, commencing on the 1st day of January, 1899.
The annual quantities of Tar produced at each of the Stations at present are, approximately, as follows:—

Avon Street	700,000 gallons.
Canons' Marsh . . .	650,000 "
Stapleton	750,000 "

Further Particulars, with Forms of Tender, may be obtained on application to the undersigned, to whom also Tenders, sealed, and endorsed "Tender for Tar," must be delivered not later than Wednesday, the 7th day of December prox.

JOHN PHILLIPS,
Secretary.

Chief Offices: Canons' Marsh,
Nov. 18, 1898.

BOROUGH OF EVESHAM.
(GAS DEPARTMENT.)

TENDERS FOR CAST-IRON MAINS.

THE Corporation invite Tenders for the supply of 4, 6, 8, 10, and 12 inch CAST-IRON MAINS.
For full Particulars, apply to the undersigned.
The Corporation do not bind themselves to accept the lowest or any Tender.

PERCY H. FLETCHER,
Engineer.

Gas-Works, Evesham,
Nov. 18, 1898.

CITY OF RIPON.

TENDERS WANTED.

THE Corporation of Ripon are prepared to receive TENDERS for a New GASHOLDER and TANK at their Gas-Works, Ripon.
Plans and Specifications prepared by the Gas Manager may be seen at his Office, Gas-Works, Ripon.
Tenders, to be marked on the outside "Tender for Contract No. 3," must be sent in to me on or before Four p.m., on Thursday, the 1st of December next.
The acceptance of the lowest or any Tender is not guaranteed.

M. KIRKLEY,
Town Clerk.

Town Hall, Ripon,
Nov. 17, 1898.

GUILDFORD GASLIGHT AND COKE COMPANY.

TENDERS FOR SULPHURIC ACID.

THE Directors of the above Company invite TENDERS for the supply of Pure BRIMSTONE ACID for the manufacture of Sulphate of Ammonia for a period of One Year from the 1st day of January, 1899.
For further Particulars, apply to the undersigned.
Sealed Tenders, endorsed "Tender for Acid," addressed to D. Williamson, Esq., J.P., Chairman of the Gas Company, must be delivered not later than Dec. 1, 1898.

WILLIAM TITLEY,
Secretary.

Gas Offices, Guildford,
Nov. 9, 1898.

SOUTHWARK AND VAUXHALL WATER COMPANY.

TO COAL MERCHANTS.

THE Directors invite Tenders for the supply at their several Stations of about 25,000 Tons (more or less) of COAL during the Year 1899.
Specification and Form of Tender may be obtained at the Office of the Engineer; and the same must be sent in not later than the 28th of November, 1898, addressed to the Chairman, Southwark and Vauxhall Water Company, Southwark Bridge Road, London, endorsed "Tender for Coal."
The Directors do not bind themselves to accept the lowest or any Tender.
Southwark and Vauxhall Water Company,
Southwark Bridge Road, S.E., November, 1898.

SOUTHWARK AND VAUXHALL WATER COMPANY.

TO PIPE FOUNDERS.

THE Directors are prepared to receive TENDERS from Manufacturers willing to supply CAST-IRON WATER-MAINS AND SPECIAL CASTINGS required by the Company.
Specification and Form of Tender may be obtained at the Office of the Engineer, and the same must be sent in not later than the 28th of November, 1898, addressed to the Chairman, Southwark and Vauxhall Water Company, Southwark Bridge Road, London, endorsed "Tender for Pipes."
The Directors do not bind themselves to accept the lowest or any Tender.
Southwark and Vauxhall Water Company,
Southwark Bridge Road, S.E., November, 1898.

CITY OF SHEFFIELD.
(WATER DEPARTMENT.)

LEAD PIPING AND GUN-METAL FITTINGS.

THE Water Committee of the Cor- poration of Sheffield invite TENDERS for the supply of LEAD PIPE, SHEET and PIG LEAD, and of BIB, STOP, and BALL COCKS, FERRULES, and other GUN METAL and BRASS CASTINGS in such quantities as may be required during the Twelve Months ending the 31st of December, 1899.
Specifications and Forms of Tender may be obtained on application to the General Manager, Water Department, Town Hall, Sheffield, on payment of One Guinea, which will be returned on receipt of a *bonâ-fide* Tender.
Tenders, endorsed "Tender for Lead Piping" and "Tender for Gun-Metal Fittings" respectively, must be sent in not later than Monday, the 5th prox., addressed to the undersigned.
The Committee do not bind themselves to accept the lowest or any Tender, and persons tendering must do so at their own cost.
The Contract will comprise the Fair Wages and Conditions of Labour Clause, which has been adopted by the Sheffield Corporation, a copy of which may be seen at this Office.

WM. TERREY,
General Manager.

Water-Works Office: Town Hall,
Sheffield, Nov. 19, 1898.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.
He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.
Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of
THE GASLIGHT AND COKE COMPANY.

ISSUE OF £187,500 ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, Tokenhouse Yard, London, E.C., on Tuesday, Dec. 6, 1898, at Two o'clock precisely, in Lots,

£187,500 OF ORDINARY STOCK OF
THE GASLIGHT AND COKE COMPANY.

This Stock, which is issued under the Provisions of The Gaslight and Coke Company's Act of 1898, ranks for a Standard Dividend of 4 per cent. subject to the Sliding-Scale, and in view of the last distribution on the Company's issued "A" Ordinary Stock would be entitled to receive a Dividend at the rate of £4 18s. per cent.
Particulars may be obtained at the OFFICES OF THE COMPANY in Horseferry Road, WESTMINSTER, S.W.; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
BRENTFORD GAS COMPANY.

£15,000 OF NEW STOCK 1881.

Ranking for a Standard Dividend of 7 per cent. per annum, subject to the Sliding-Scale; the last Dividend on similar Stock having been at the rate of 9 per cent.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Wednesday, Nov. 23, at Two o'clock precisely, in Lots.
Particulars may be obtained of the SECRETARY of the Company, at the Offices, BRENTFORD; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND GAS COMPANY.

NEW ISSUE OF £13,500 FIVE PER CENT. STOCK.

Ranking for a Standard Dividend of 5 per cent. subject to the Sliding Scale; but in view of the Dividends paid in June last entitled to pay 5½ per cent.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Nov. 29, at Two o'clock, in Lots.
Particulars at the Company's Offices, SOUTHEND; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

MR. ALFRED RICHARDS will also include in the above Sale on the 29th of November Shares in the
GREAT YARMOUTH WATER-WORKS COMPANY,
SOUTH-WEST SUBURBAN WATER COMPANY, and the
BARNET DISTRICT GAS AND WATER COMPANY.
Particulars of the AUCTIONEER as above.

By order of the Directors of the
NORTH MIDDLESEX GAS COMPANY.

500 £10 ORDINARY SHARES.

Ranking for a Standard Dividend of 7 per cent., subject to the Sliding-Scale—the last Dividend on similar Shares having been at this rate.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Dec. 13, at Two o'clock, in Lots.
Particulars of Messrs. MERRIMAN, PIKE, AND MERRIMAN, Solicitors, 25, AUSTIN FRIARS, E.C.; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

131 £10 "B" SHARES (FULLY PAID) IN
THE BOURNEMOUTH GAS AND WATER COMPANY.

Ranking for a Maximum Dividend of 7 per cent.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Dec. 13, at Two o'clock, in Lots.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

GEORGE A. CHAPMAN.
STOCK AND SHARE DEALER,
51, MOORGATE STREET, LONDON, E.C.

SHARES ON SALE—£400 Northfleet and GREENHITHE GAS COMPANY'S STOCK; £700 of the 4 per cent. DEBENTURE BONDS in the HENLEY-ON-THAMES WATER COMPANY, Limited; a few SHARES in the WESTERHAM GAS AND COKE COMPANY; 20 £10 fully-paid, 7 per cent. "B" SHARES in the HORSHAM GAS COMPANY, Limited, and 15 £10 fully-paid "A" SHARES in the same Company; 100 ORDINARY and 80 PREFERENCE SHARES in METERS LIMITED.
WANTED, SHARES in METERS LIMITED, Ordinary and Preference, and also SHARES in GAS and WATER COMPANIES.
ALL CLASSES OF GAS AND WATER SHARES DEALT IN.

CARDIFF GASLIGHT AND COKE COMPANY.

(INCORPORATED 5TH MAY, 1837.)

THE Directors of the Cardiff Gaslight and Coke Company Hereby Give Notice that they are prepared to receive, not later than Thursday, the 1st of December, 1898, Sealed TENDERS for £10,000 "D" STOCK,

bearing a Maximum Dividend of 5 per cent. per annum, in pursuance of the Powers of the Cardiff Gas Act, 1887.

Conditions and Forms of Tender, together with further Information, may be obtained on application to the undersigned.

By order,
GEORGE CLARRY,
Secretary.

Gas Office, Cardiff,
Oct. 12, 1898.

EAST LONDON WATER-WORKS COMPANY.

ISSUE OF £150,000 THREE PER CENT. DEBENTURE STOCK.

MINIMUM PRICE, PAR.

NOTICE is Hereby Given, that the Directors are prepared to receive TENDERS for the ABOVE ISSUE (created under the East London Water-Works Act of 1897), bearing Interest at 3 per cent. per annum, less income-tax, and redeemable after the expiration of 25 Years from the date of Issue, subject to Six Months' Notice being given by the Company.

Tenders must be delivered at the Company's Offices, St. Helen's Place, Bishopsgate Street, E.C., not later than Eleven a.m., on Monday, Dec. 12 ensuing.

Particulars and Conditions, together with Form of Tender, may be obtained at the said Offices, or will be forwarded on application.

By order of the Court of Directors,
I. A. CROOKENDEN,
Secretary.

St. Helen's Place,
Bishopsgate Street, E.C.,
Nov. 15, 1898.

LIVERPOOL UNITED GASLIGHT COMPANY.

SALE OF NEW SEVEN PER CENT. STOCK.

TO BE SOLD BY AUCTION BY

MESSRS. BRANCH AND LEETE on Tuesday, the 13th day of December, 1898, at Twelve o'clock noon precisely, at the Law Association Rooms, Cook Street, in Liverpool, subject to the Conditions of Sale which will then be produced,

THE SUM OF £40,000 NEW STOCK

OF AND IN THE

LIVERPOOL UNITED GASLIGHT COMPANY

Created under the Powers of the Liverpool United Gaslight Company's Act, 1836.

The Stock will be offered in Lots of the nominal amount of £100 each, and will be issued to each purchaser as paid up Stock, after full payment of the purchase money.

For further Particulars, apply to Mr. J. F. ROBINSON, Treasurer, Gas Office, Duke Street; or to Messrs. GARNETT, TARBET, AND CO., Solicitors, Queen Insurance Buildings, Castle Street, LIVERPOOL.

THE SOUTH SHIELDS GAS COMPANY.

IMPORTANT SALE OF GAS STOCK.

MR. M. STAINTON is instructed by the Gas Company to SELL BY PUBLIC AUCTION, in the Board-Room, at the Gas Offices, Chapter Row, South Shields, on Monday, the 5th of December, 1898, at One o'clock p.m., prompt, £8000 of NEW STOCK, under the South Shields Gas Act, 1886.

The Stock will be put up in Lots of £100 each, nominal value. A Deposit of £10 per cent. to be paid on the purchase money at the Sale; the remainder to be paid to the Company's Bankers, the North-Eastern Banking Company, Limited, King Street, South Shields, on or before the 31st of December next.

The Stock will rank for Dividend from the 1st of January, 1899.

The Stock will be registered in the name of the Purchaser free of expense.

By order of the Directors,
J. H. PENNEY,
Secretary.

Gas Offices, Chapter Row,
South Shields, November, 1898.

ALTRINCHAM GAS COMPANY.

ISSUE OF NEW CAPITAL UNDER POWERS CONTAINED IN THE ALTRINCHAM GAS ACT, 1893.

THE above Company will offer for Sale BY PUBLIC AUCTION, on Tuesday, the 6th of December, 1898, at the Old Town Hall, Altrincham, at Seven o'clock in the Evening precisely—

£5000 NEW CAPITAL IN 500 £10 SHARES, divided into FIFTY LOTS of TEN SHARES each.

The Sale will be subject to Conditions and in accordance with the Provisions of the above Act.

The Maximum Dividend payable on the Shares now offered for sale will be 7 per cent. per annum.

The Purchase Money of each lot must be paid as follows: 20 per cent. on the day of sale, and the balance by the 31st of December, 1898.

Conditions of Sale can be obtained on and after the 22nd of November inst., on application at the COMPANY'S OFFICES, Moss Lane, ALTRINCHAM; or to Messrs. NICHOLLS, HARRIS, & LINDSELL, Altrincham, and 31, Dickinson Street, MANCHESTER.

Nov. 3, 1898.

THE Acetylene Illuminating Company, Limited, 63, Queen Victoria Street, London, E.C., GIVE NOTICE that they hold the BRITISH PATENT RIGHTS for the MANUFACTURE OF CALCIUM CARBIDE by means of the electric furnace, that they are bringing an action against the Midland Acetylene (Parent) Syndicate, Limited, to restrain them from so manufacturing that product, and that they intend in the future to bring actions against all infringers of these Patents and all purchasers or users of Carbide of Calcium made in infringement of the same.

NOTICE.

THE Acetylene Illuminating Company, Limited, having published and issued an advertisement or circular claiming that they hold the British Patents for the Manufacture of Calcium Carbide by means of the Electric Furnace, we guarantee to indemnify anyone who buys Carbide from us against any claim by "The Acetylene Illuminating Company, Limited," or anyone else.

READ HOLLIDAY AND SONS, LIMITED, Acetylene Gas Engineers and Carbide of Calcium Manufacturers, HUDDERSFIELD.

NOTICE.

THE Acetylene Illuminating Company, Limited, having published and issued an advertisement or circular claiming that they hold the British Patents for the Manufacture of Calcium Carbide by means of the Electric Furnace, we guarantee to indemnify anyone who buys Carbide from us against any claim by "The Acetylene Illuminating Company, Limited," or anyone else.

TINKER AND HOLLIDAY, LIMITED, Carbide of Calcium Manufacturers, HAZELHEAD, SHEFFIELD.

THE
ACETYLENE ILLUMINATING COMPANY, LTD.,
Manufacturers of Carbide of Calcium,
63, QUEEN VICTORIA STREET, LONDON, E.C.,
and FOYERS, SCOTLAND.

NOTICE.

MESSRS. Read Holliday & Sons, Ltd., of Huddersfield, and Messrs. Tinker, Holliday, & Co., Limited, of Hazelhead, Sheffield, having advertised that they are Manufacturers of Carbide of Calcium, and having guaranteed to indemnify anyone who buys Carbide from them, against any claim by the Acetylene Illuminating Company, Limited, Notice is Hereby Given by the Acetylene Illuminating Company, Limited, that they have been unable to secure any evidence, and do not believe, that either of the said Firms is, a Manufacturer of Carbide of Calcium.

The Acetylene Illuminating Company, Limited, for over two years, have been supplying Carbide to Messrs. Read Holliday & Sons. This Firm has, since advertising as above mentioned, ordered a further supply, which order the Acetylene Illuminating Company, Limited, have declined to execute in view of such advertisement.

On the Acetylene Illuminating Company, Limited, securing evidence that either of the above Firms, or any other Person or Firms are manufacturing or importing Carbide of Calcium, they will bring an action for Infringement of their Patent Rights.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.
8 Lombard Street,
NEWCASTLE-ON-TYNE.
W. RICHARDSON, Fitter.

Now Ready, Price 15s., Limp Cloth, the

EIGHTEENTH YEARLY

ANALYSIS OF THE ACCOUNTS

OF THE

METROPOLITAN WATER COMPANIES,

Chelsea, East London, Grand Junction, Kent, Lambeth, New River, Southwark and Vauxhall, and West Middlesex—showing the Capital, Income, Expenditure, Profits, and Dividends per Million and per Thousand Gallons of Water supplied; the proportion of Expenditure and Profits to Gross Income; and the Income, Expenditure, and Profits per House, &c., supplied for the Year ended Dec. 31, 1897, or March 31, 1898, together with the Quantity of Water supplied, the estimated Daily Quantity supplied for Domestic and other Purposes, the Quantity supplied per Head of Population, &c., &c., for the Year ended Dec. 31, 1897.

Compiled and arranged by

ALFRED LASS, F.C.A.

LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

ENRICH YOUR GAS

WITH

CHEAP BENZOL.

AT to-day's Price of Benzol, Illuminating POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.

Apply to SADLER & CO., MIDDLESBROUGH.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
GAS ENGINEERS' AGENTS AND CONTRACTORS FOR
Meters, Fire-Clay Goods, Oxide of Iron, and all other Gas Apparatus. Retort Carbon purchased.
Inquiries Solicited.
Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD
BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

INCANDESCENT GAS LIGHTING.

Incandescent Burners from **5/6 per doz.**

Specially annealed best Fireproof Glass Chimneys (equal to the Jena.) **1/4** per Doz.

All other Incandescent Fittings at greatly reduced Prices.

Best "Comet" Bulbs, 3s. per Dozen.

Write for Illustrated Price Lists.

WHOLESALE FITTINGS COMPANY,
80, COMMERCIAL ROAD, LONDON, E.

TROTTER, HAINES, & CORBETT,

Brettell's Estate

FIRE-CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Proprietors of

BEST GLASSHOUSE POT & CRUCIBLE CLAY.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 84, OLD BROAD ST., E.C.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL Co., Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by

Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton . .	10,500 Cub. Ft.
Illuminating Power . .	16·9 Candles.
Coke (of good quality) .	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.

QUAYSIDE, NEWCASTLE-ON-TYNE.

HOLMSIDE

GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . .	11,205 Cubic Feet.
Illuminating Power	16 $\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality)	13 $\frac{3}{4}$ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR

PELTON GAS COALS.

Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,

HOLMSIDE & SOUTH MOOR OFFICES,

NEWCASTLE-UPON-TYNE.

WATERBLEAN PAINT

TELEGRAMS: "EVESON, BIRMINGHAM."

EVESON FOR CANNEL

TUBES AND FITTINGS

ALL KINDS

WRITE FOR PRICES

STAFFORDSHIRE TUBE Co., BIRMINGHAM.

HEATHCOTE GAS COAL.

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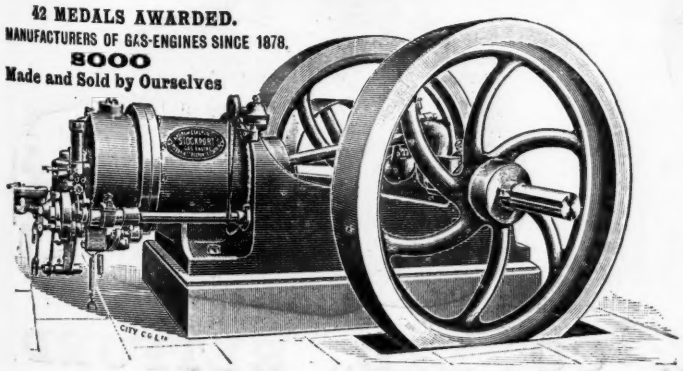

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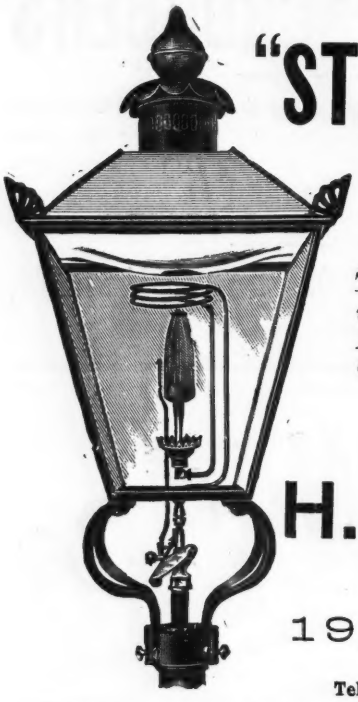

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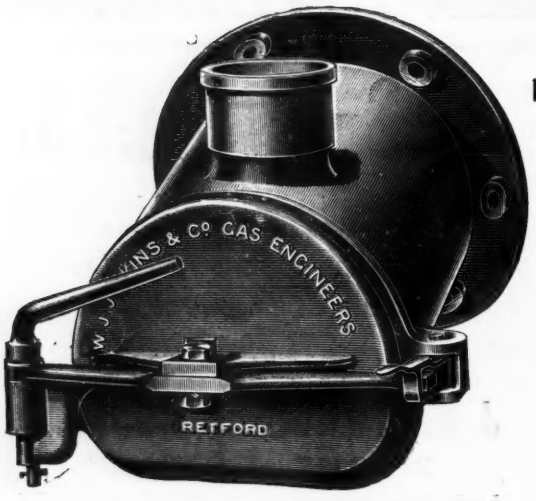

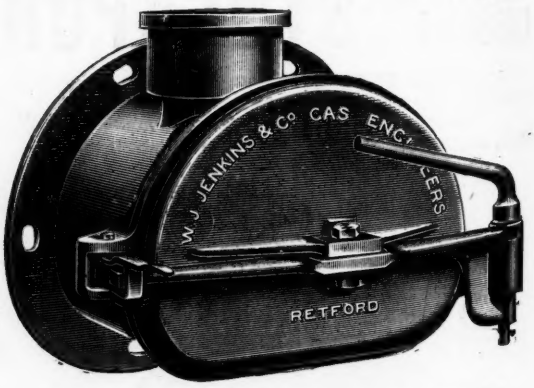

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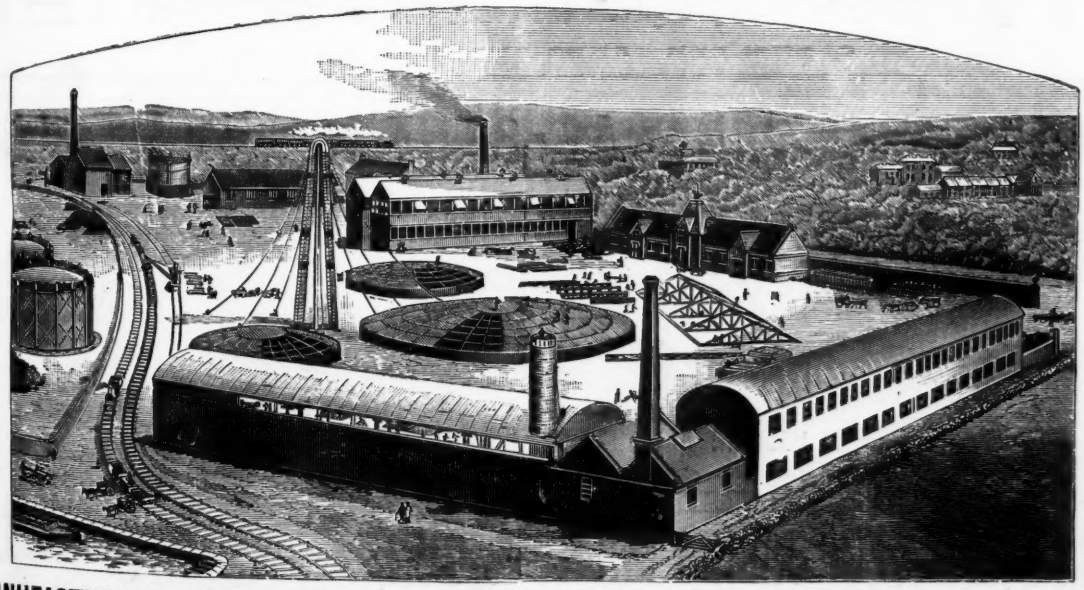

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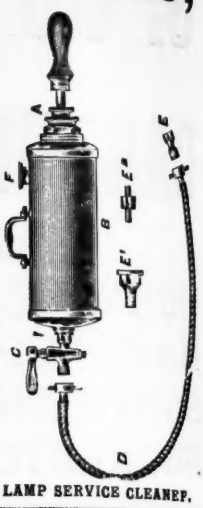

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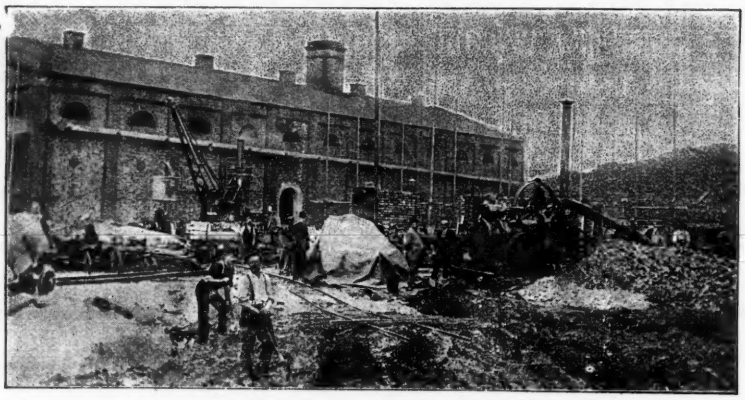

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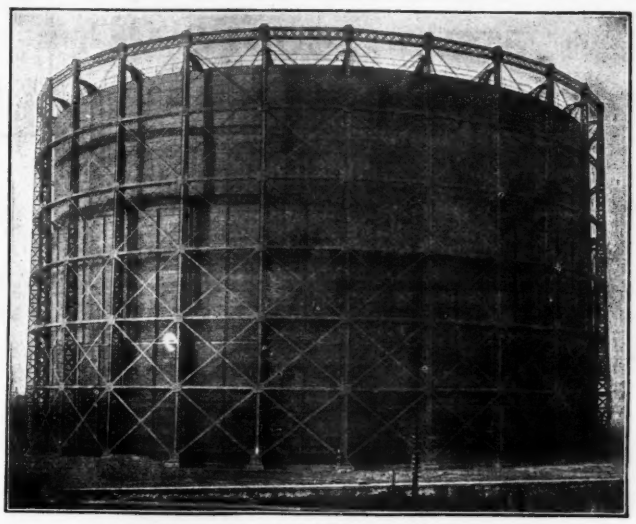

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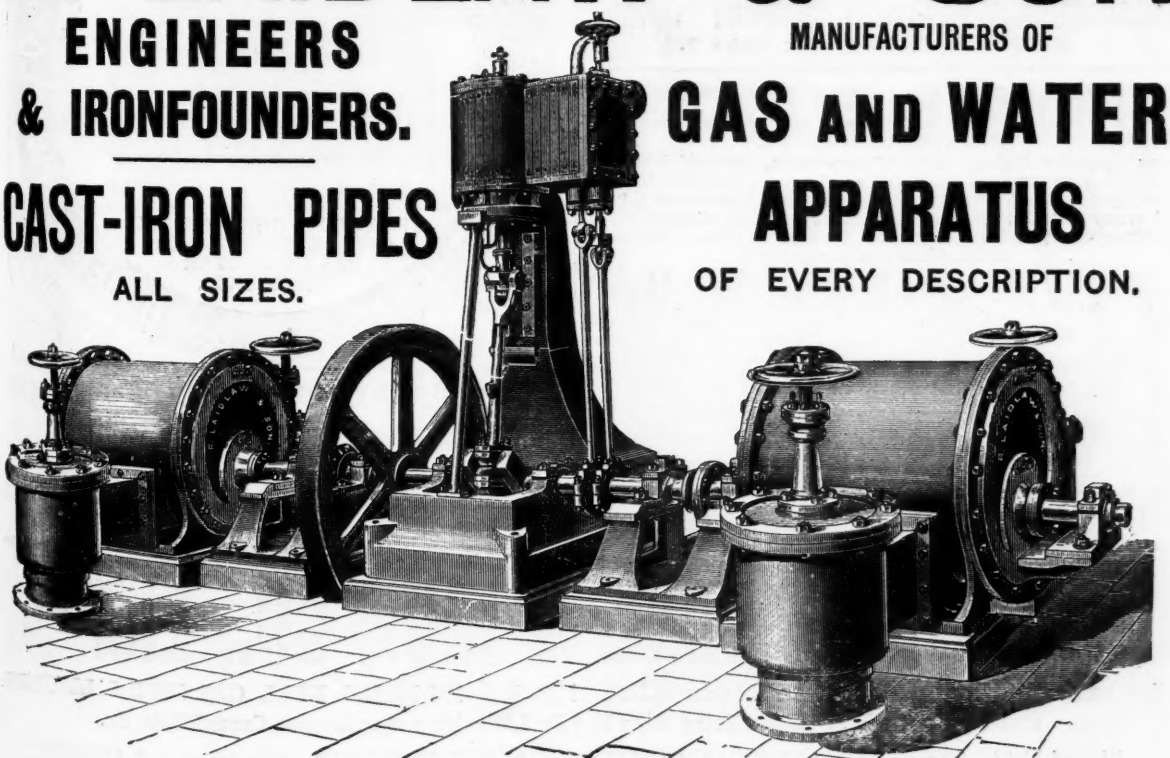

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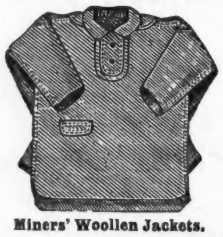

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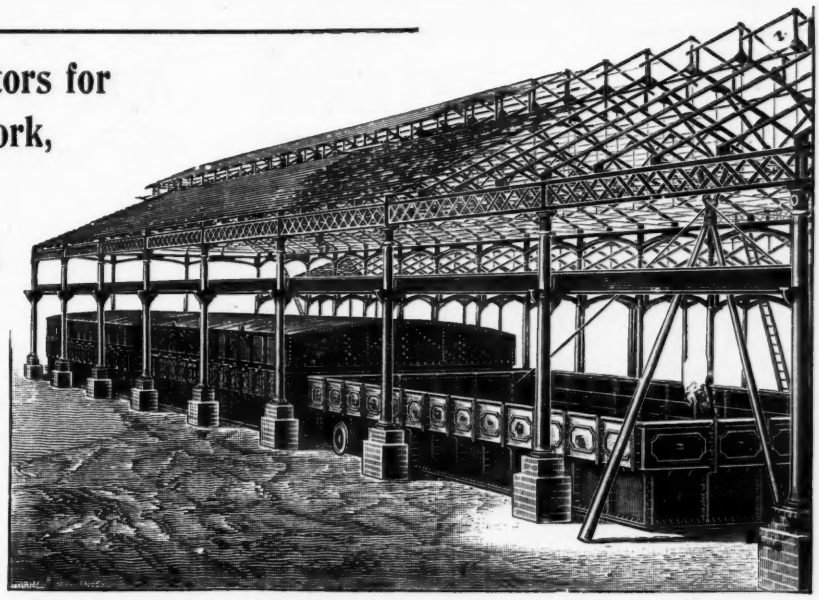

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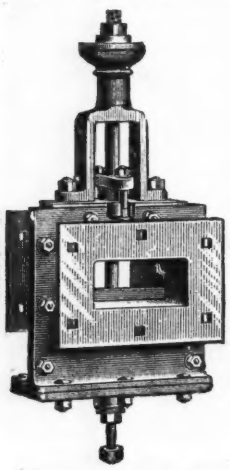

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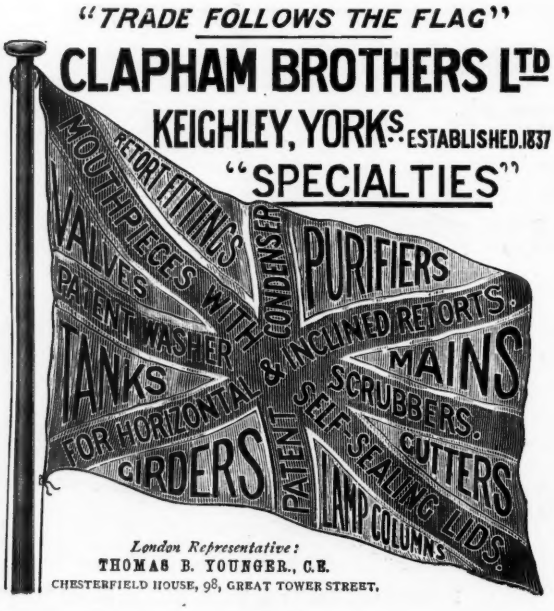

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